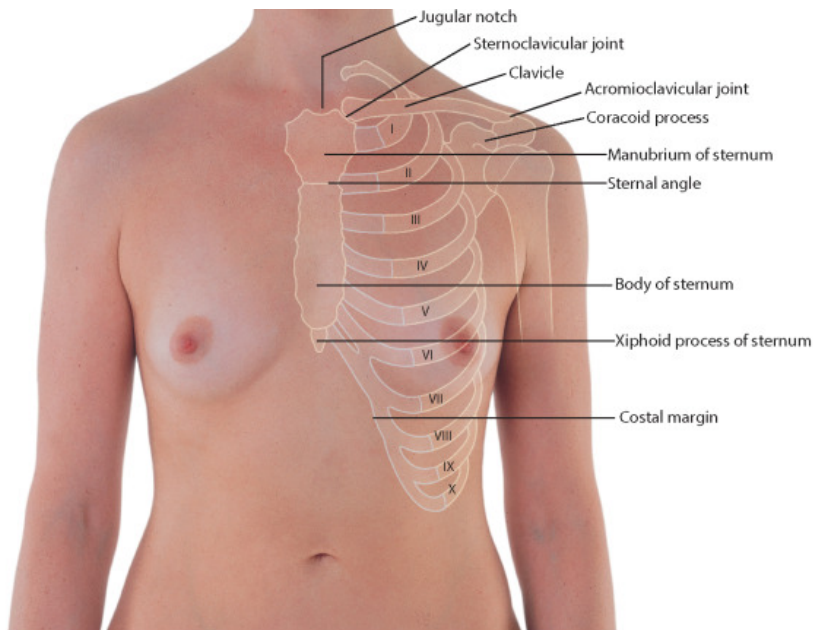
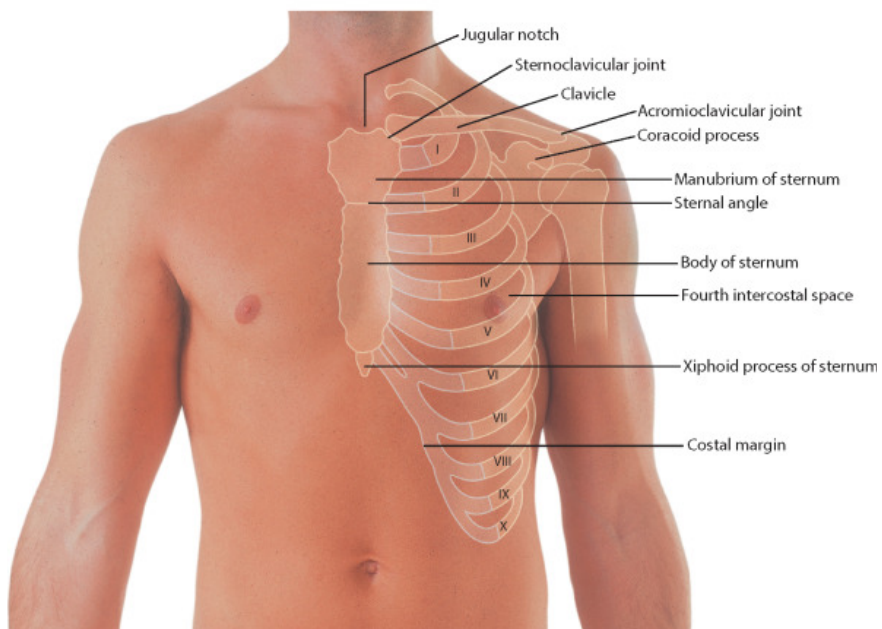

BOOK CHAPTER**THORAX**

Richard L. Drake PhD, FAAA, A. Wayne Vogl PhD, FAAA and Adam W.M. Mitchell MBBS, FRCS, FRCR
Gray's Atlas of Anatomy, 3, 61-132

Surface anatomy with bones

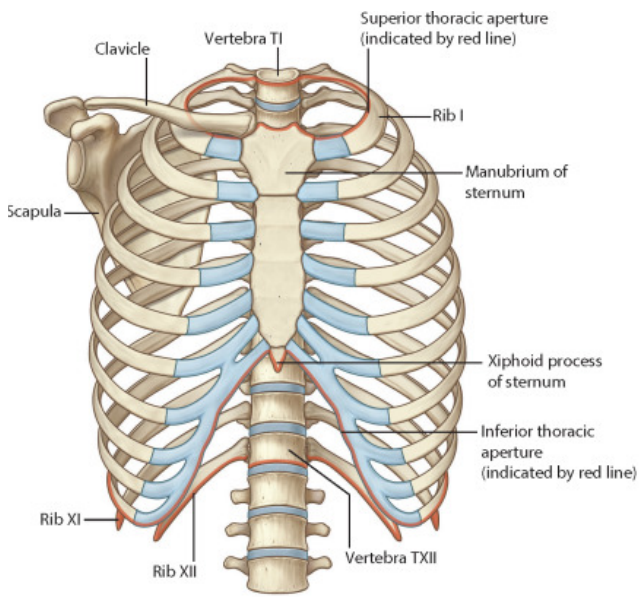


Anterior chest wall in a woman

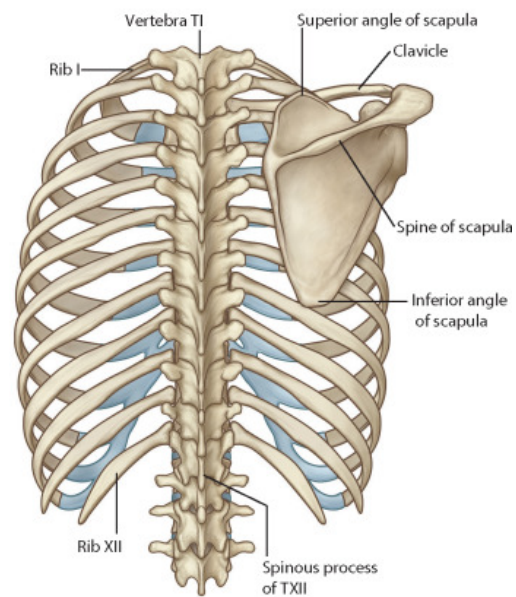


Anterior chest wall in a man

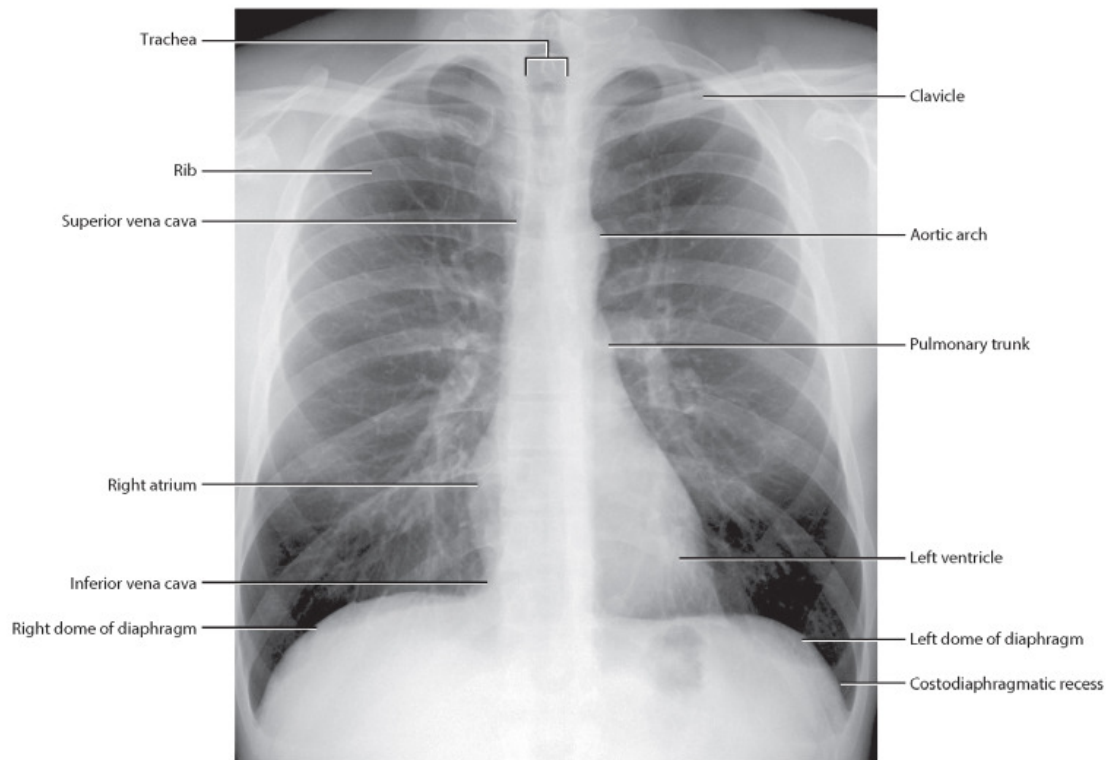
Bony framework



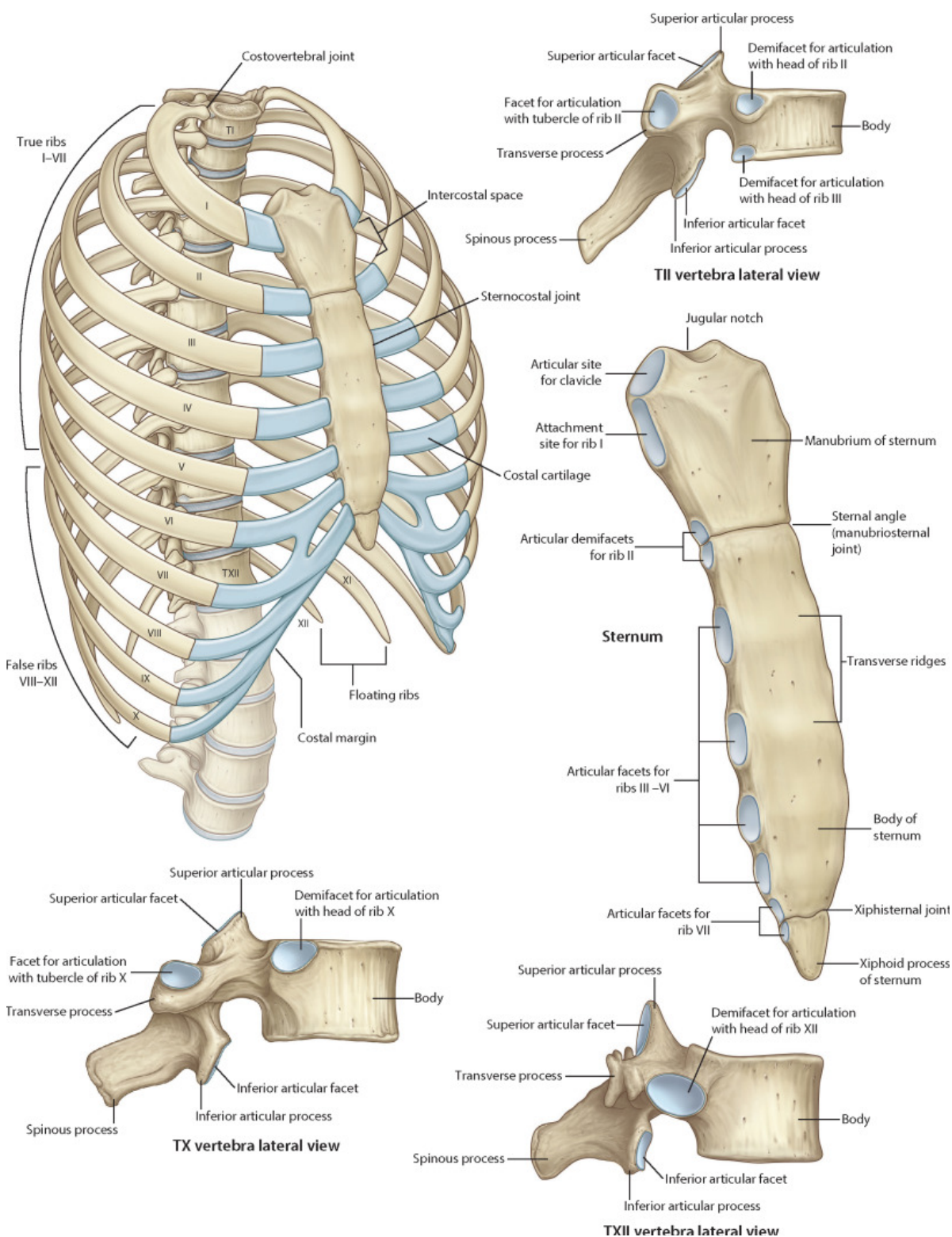
**Bony framework of thorax
(anterior view)**



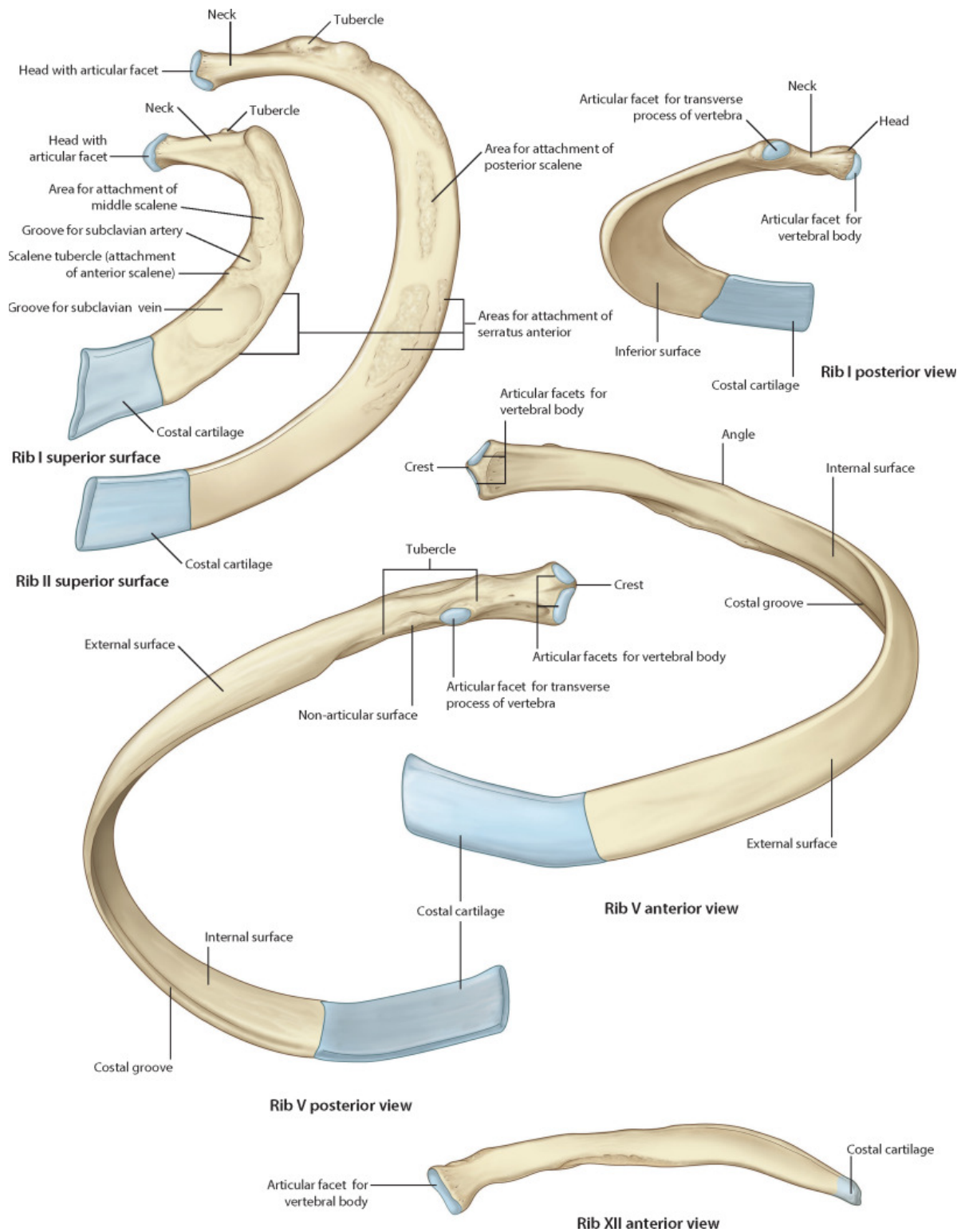
**Bony framework of thorax
(posterior view)**



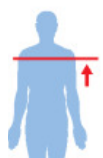
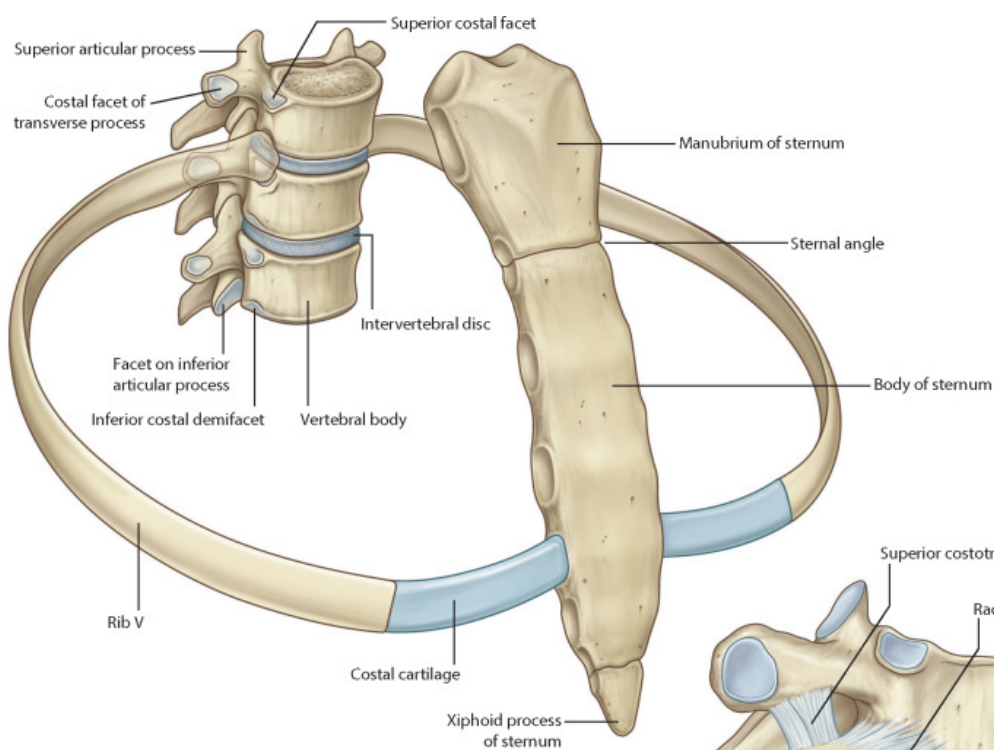
**Positioning of structures in chest.
Radiograph, AP view**



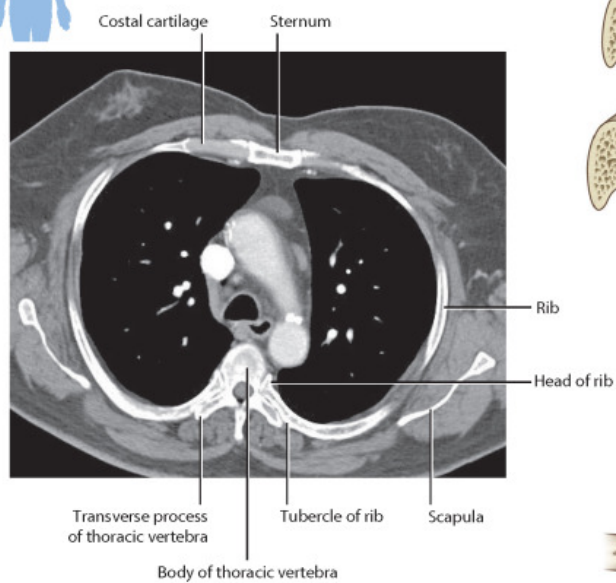
Ribs



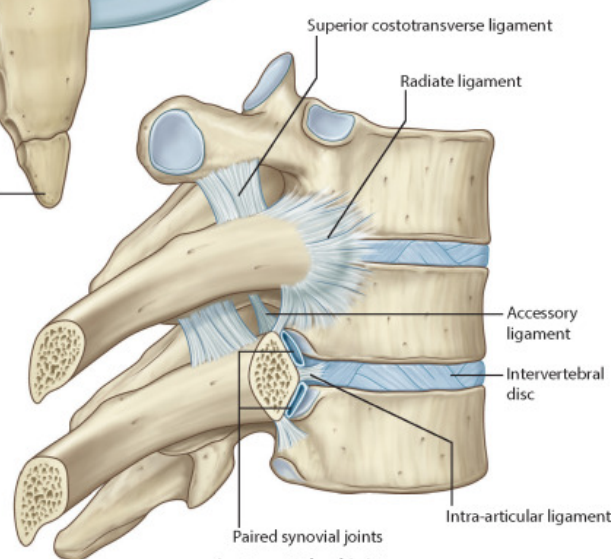
Articulations



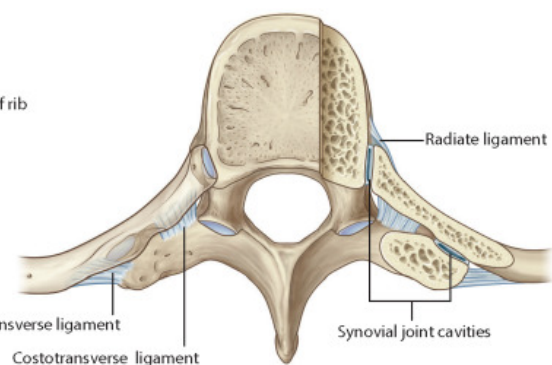
Costovertebral and sternocostal joints



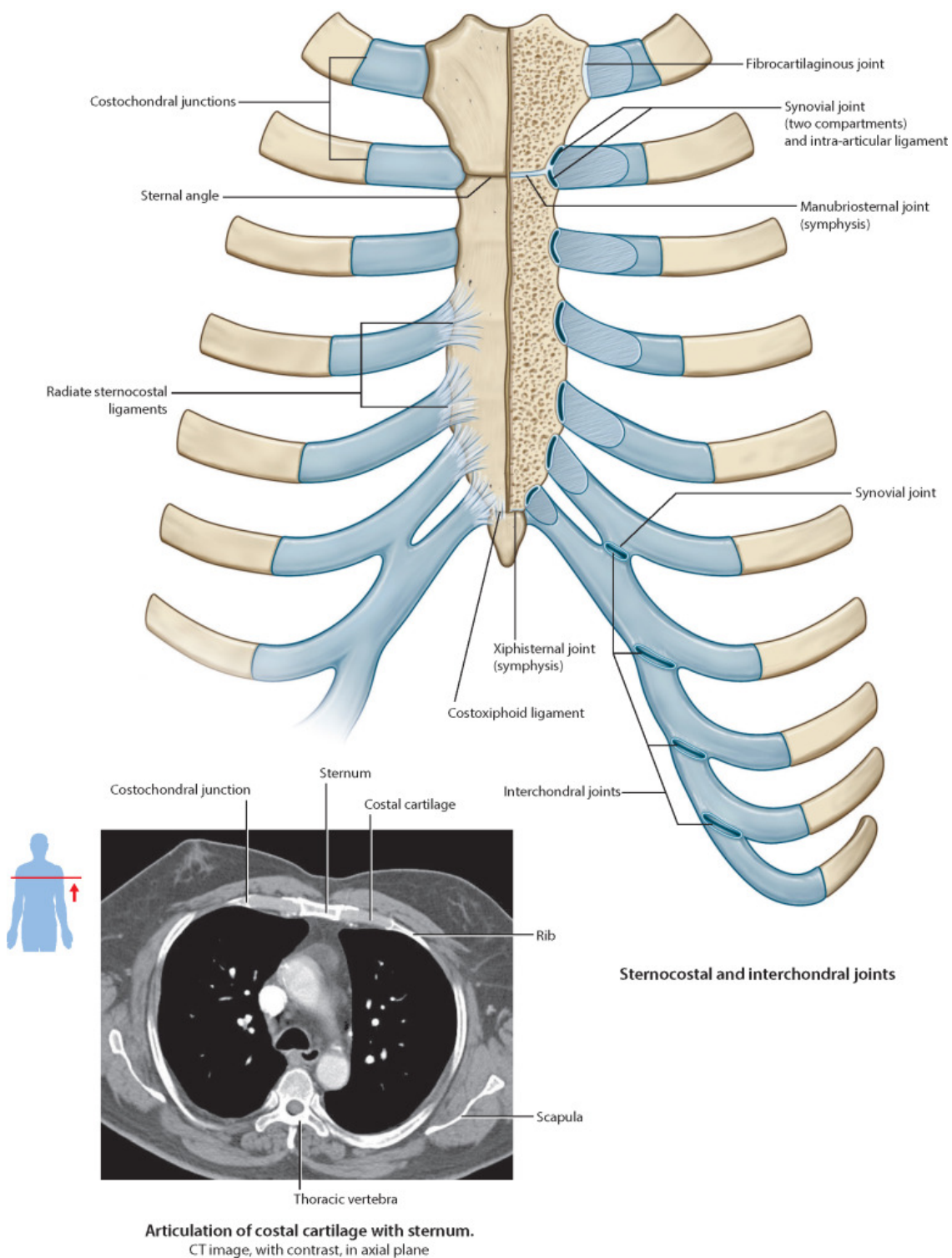
Articulation of rib with thoracic vertebra (TIV).
CT image, with contrast, in axial plane



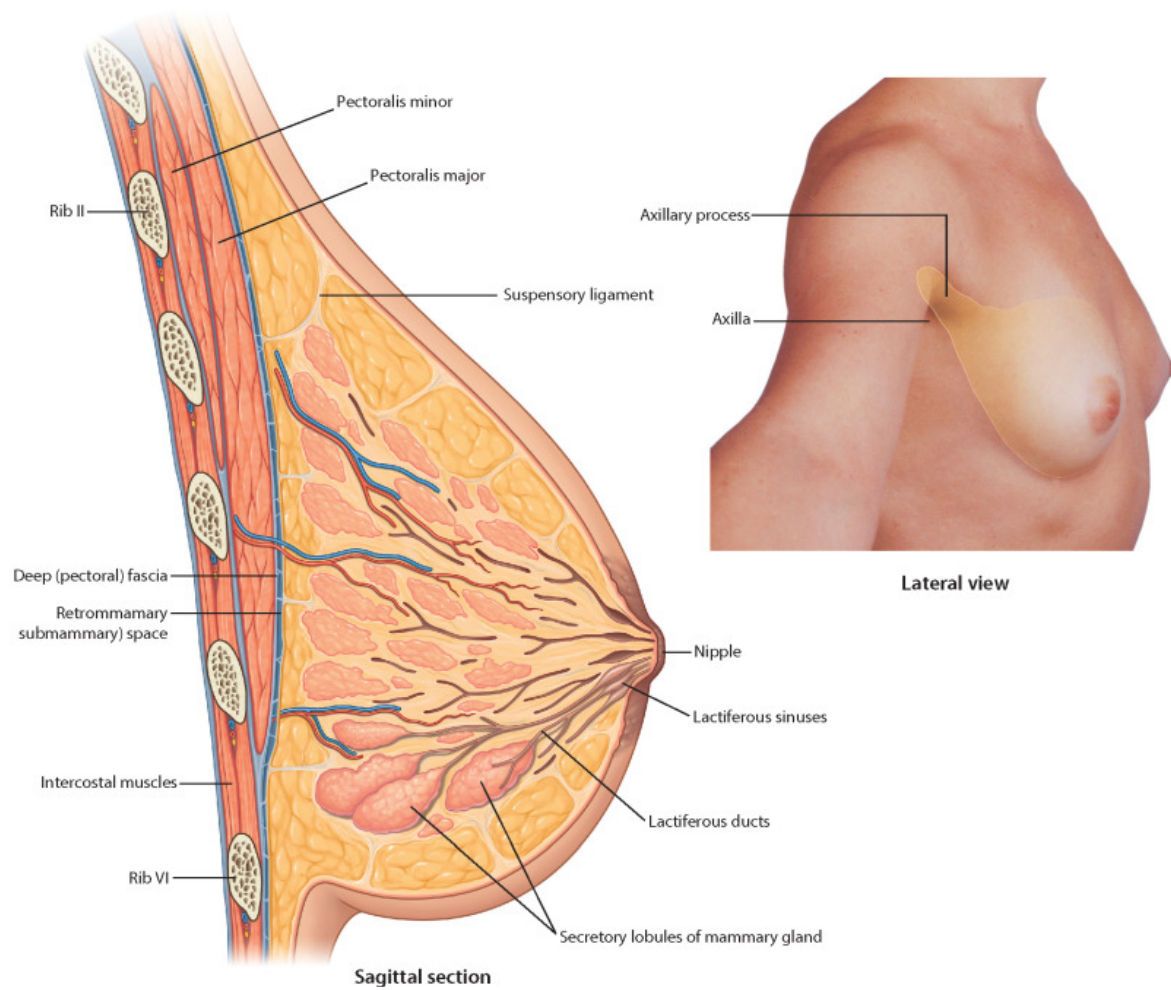
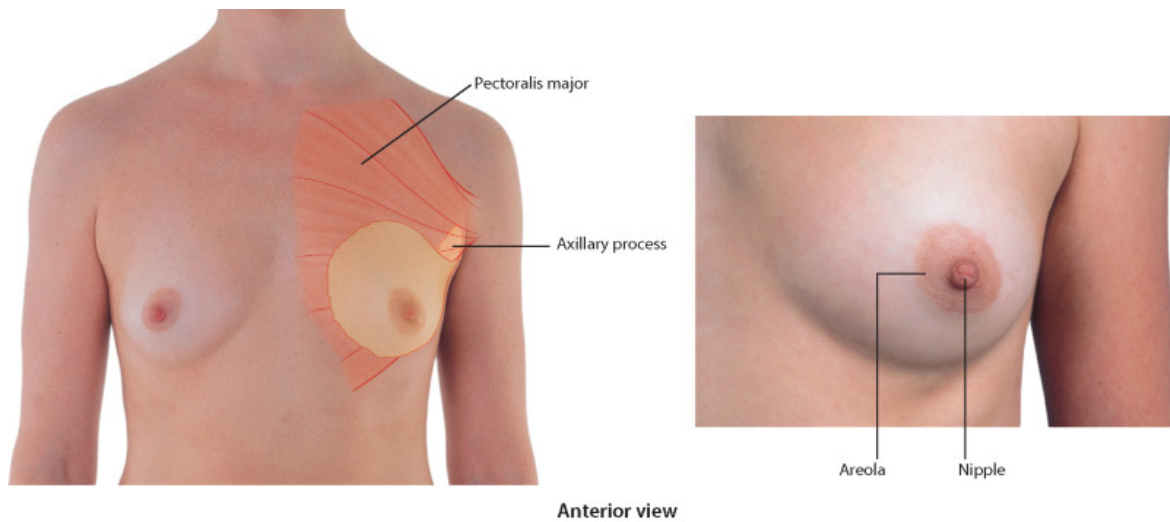
Costovertebral joints (lateral view)

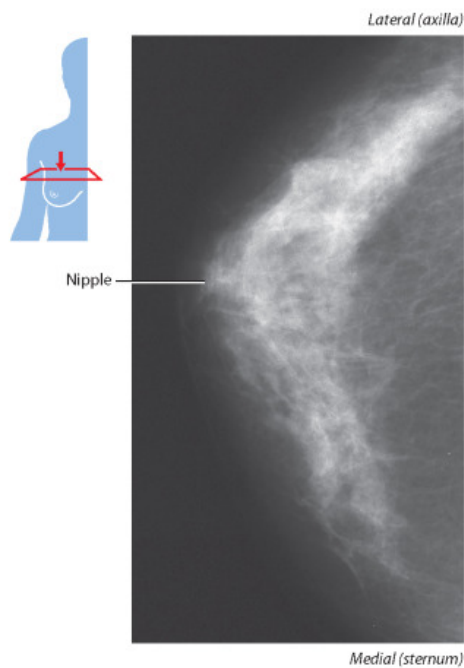
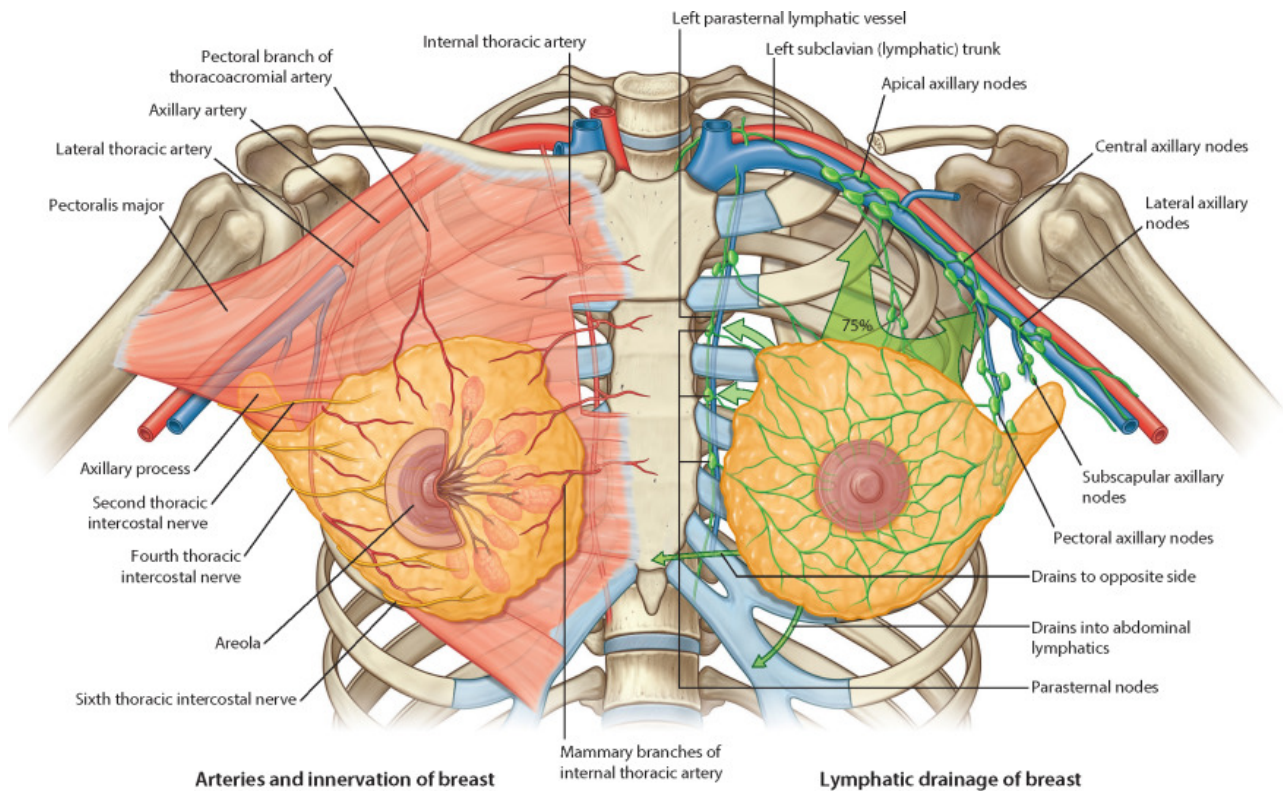


Costovertebral joints (superior view)

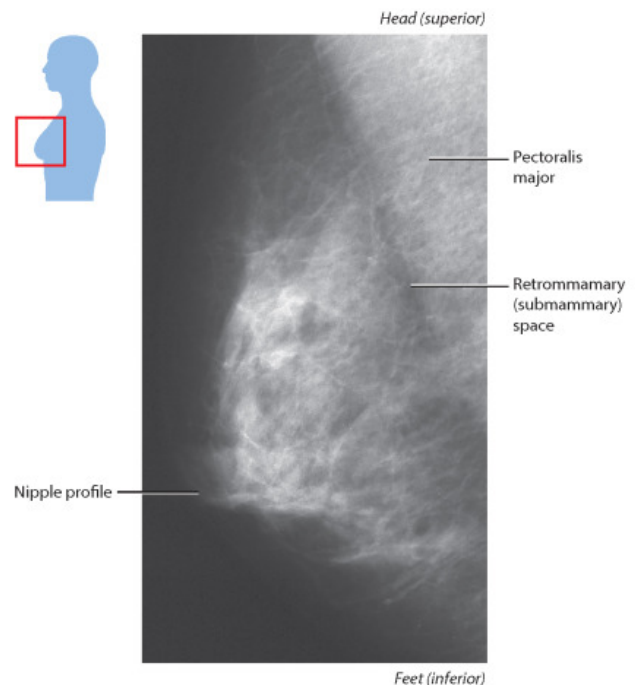


Breast



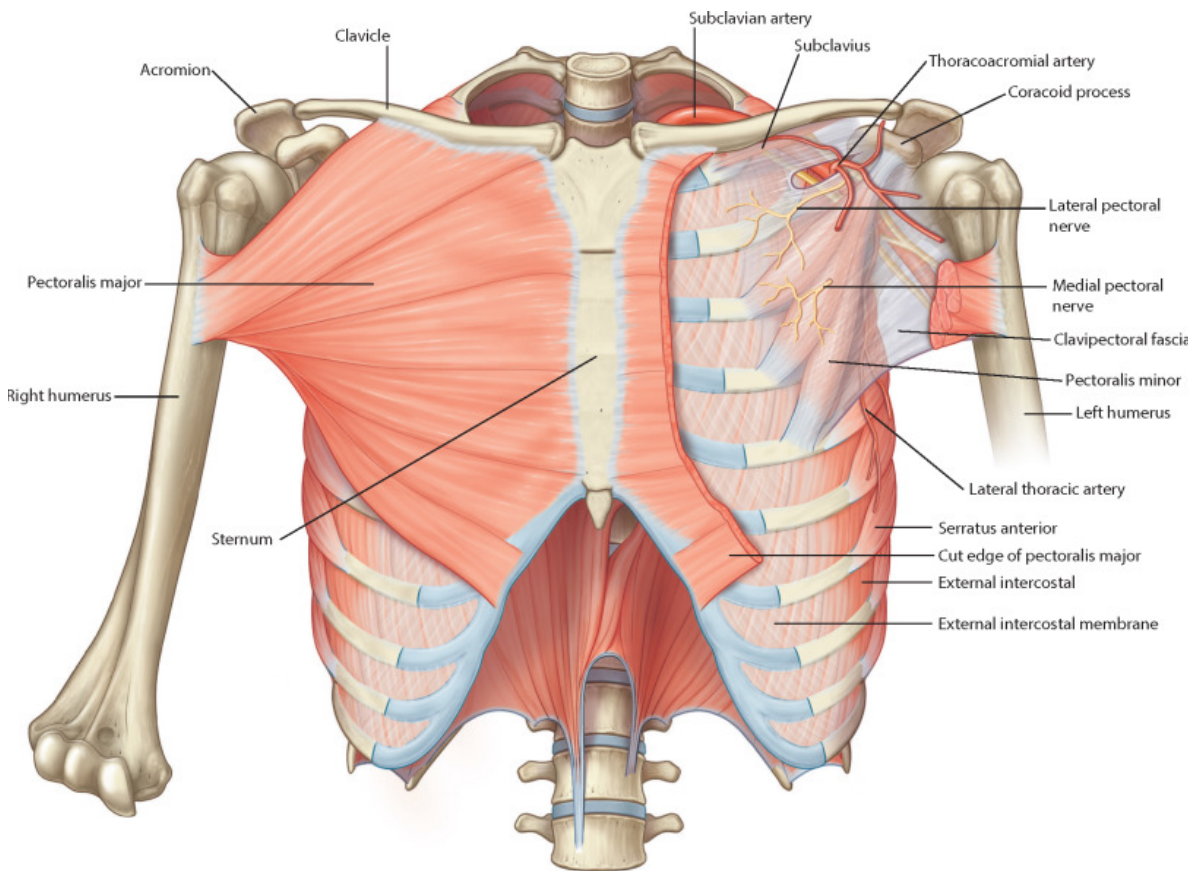


Mammography. Craniocaudal (cc) view of a normal right breast showing a heterogeneously dense appearance

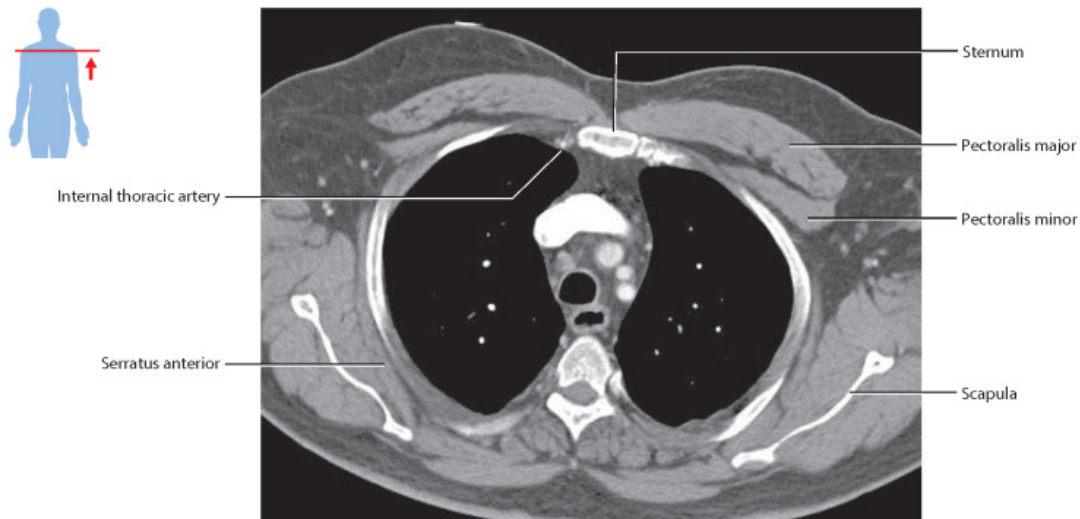


Mammography. Mediolateral oblique (mlo) view of a normal right breast showing a heterogeneously dense appearance

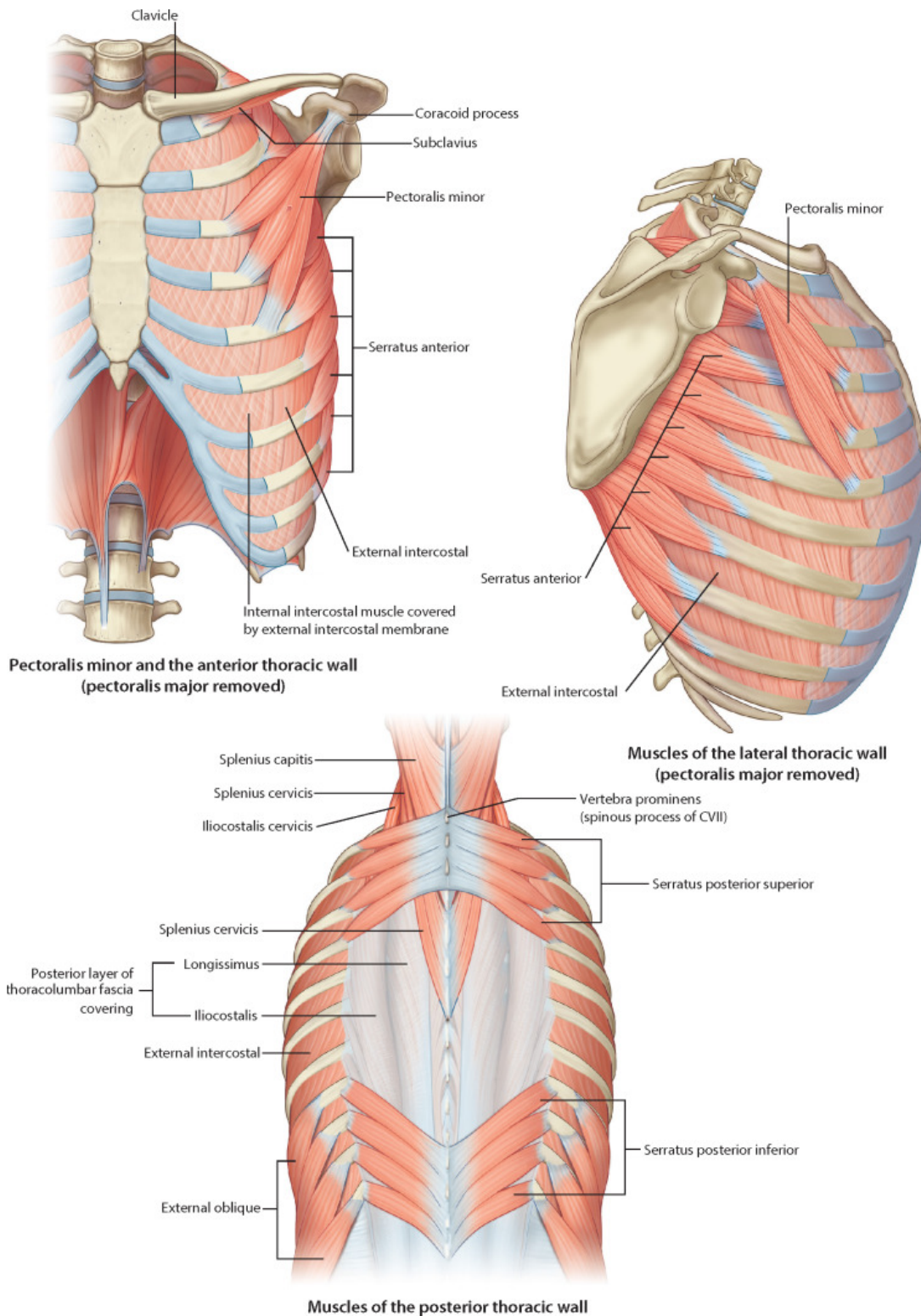
Pectoral region



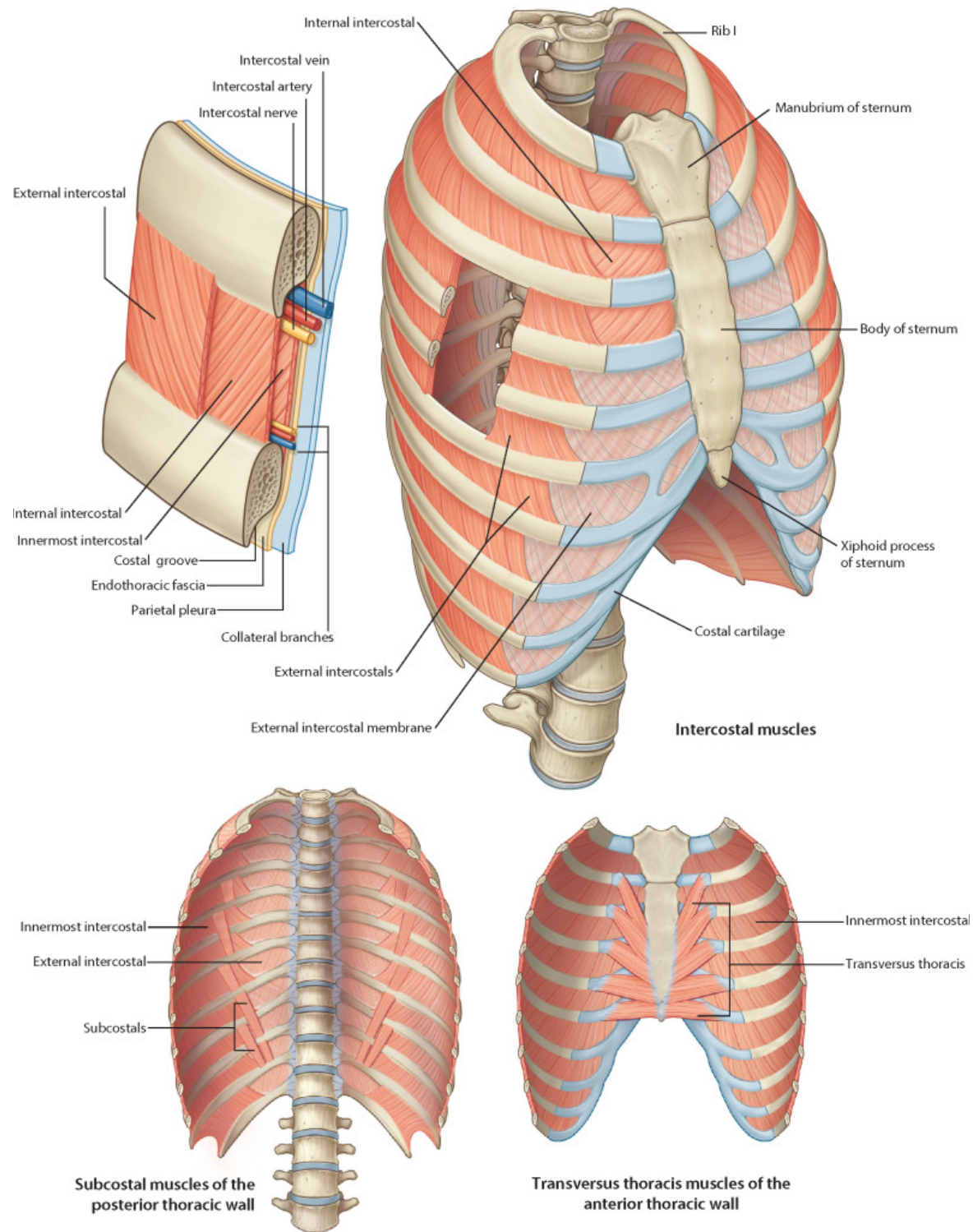
Pectoralis major muscle and related deep structures



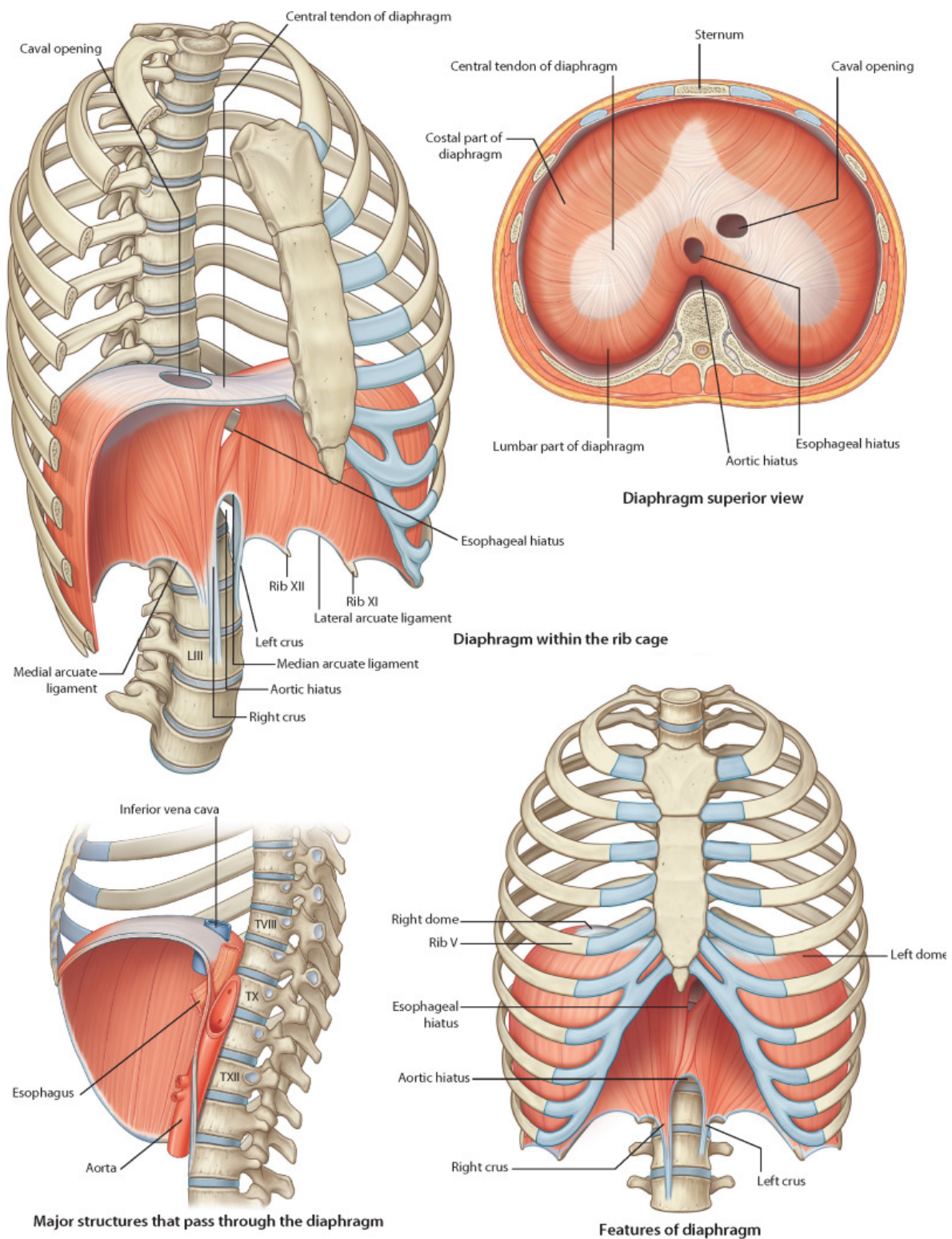
Pectoralis major and minor muscles on anterior thoracic wall.
CT image, with contrast, in axial plane



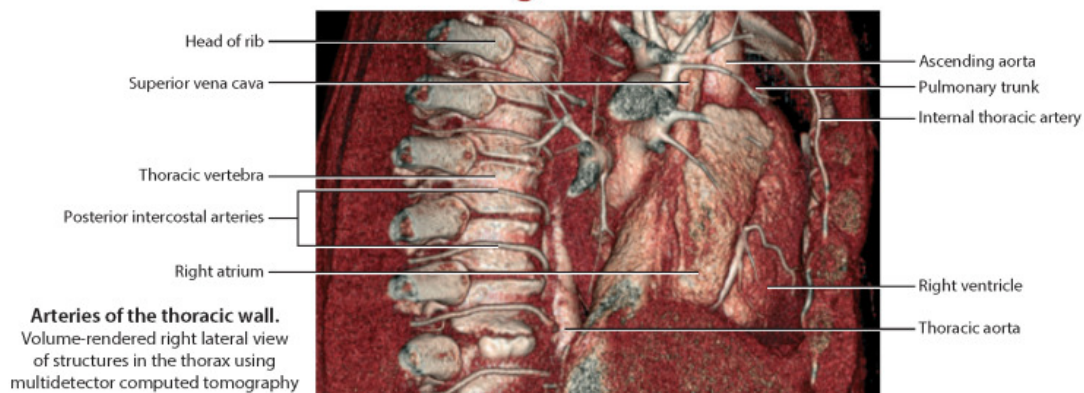
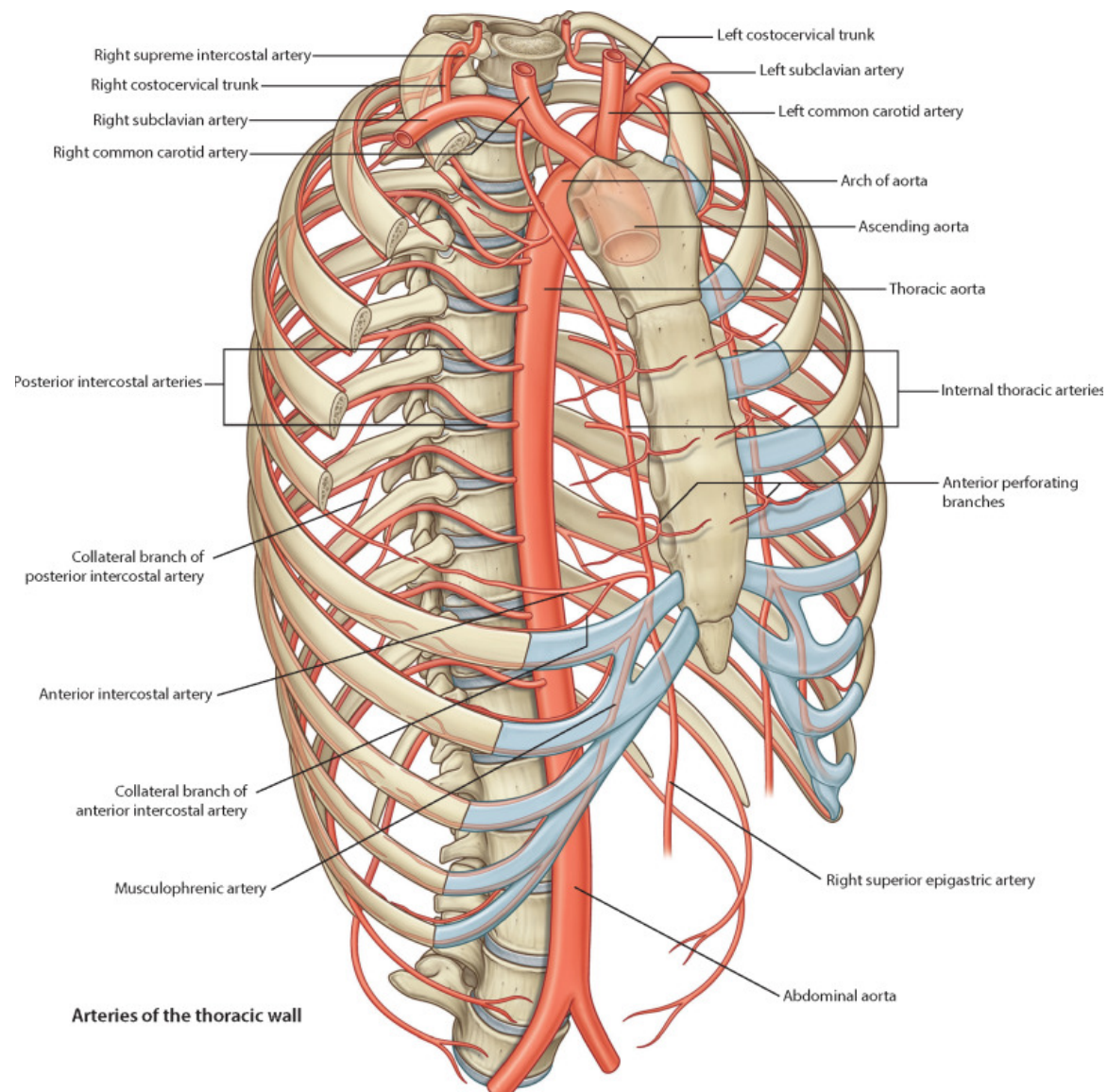
Thoracic wall muscles



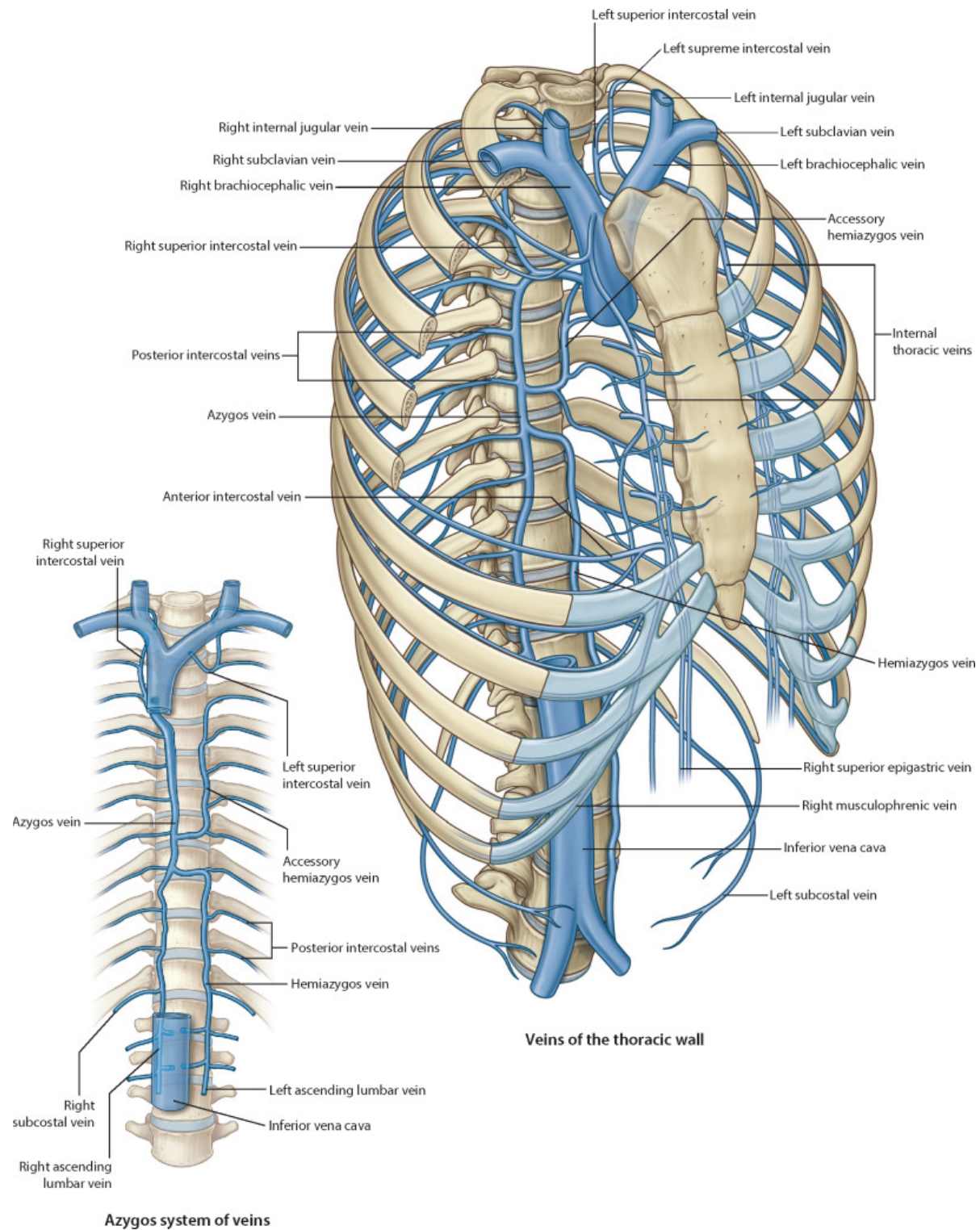
Diaphragm



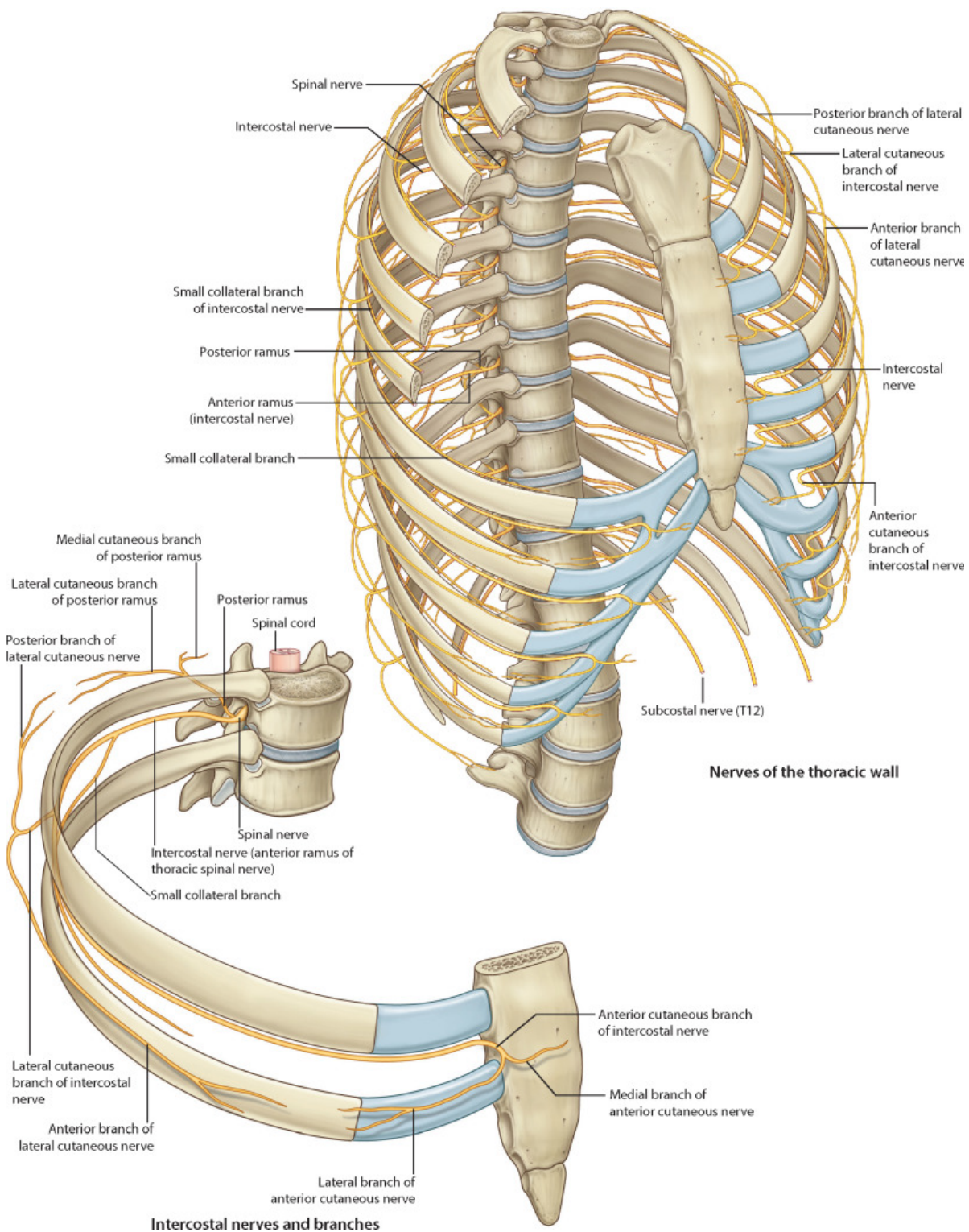
Arteries of the thoracic wall



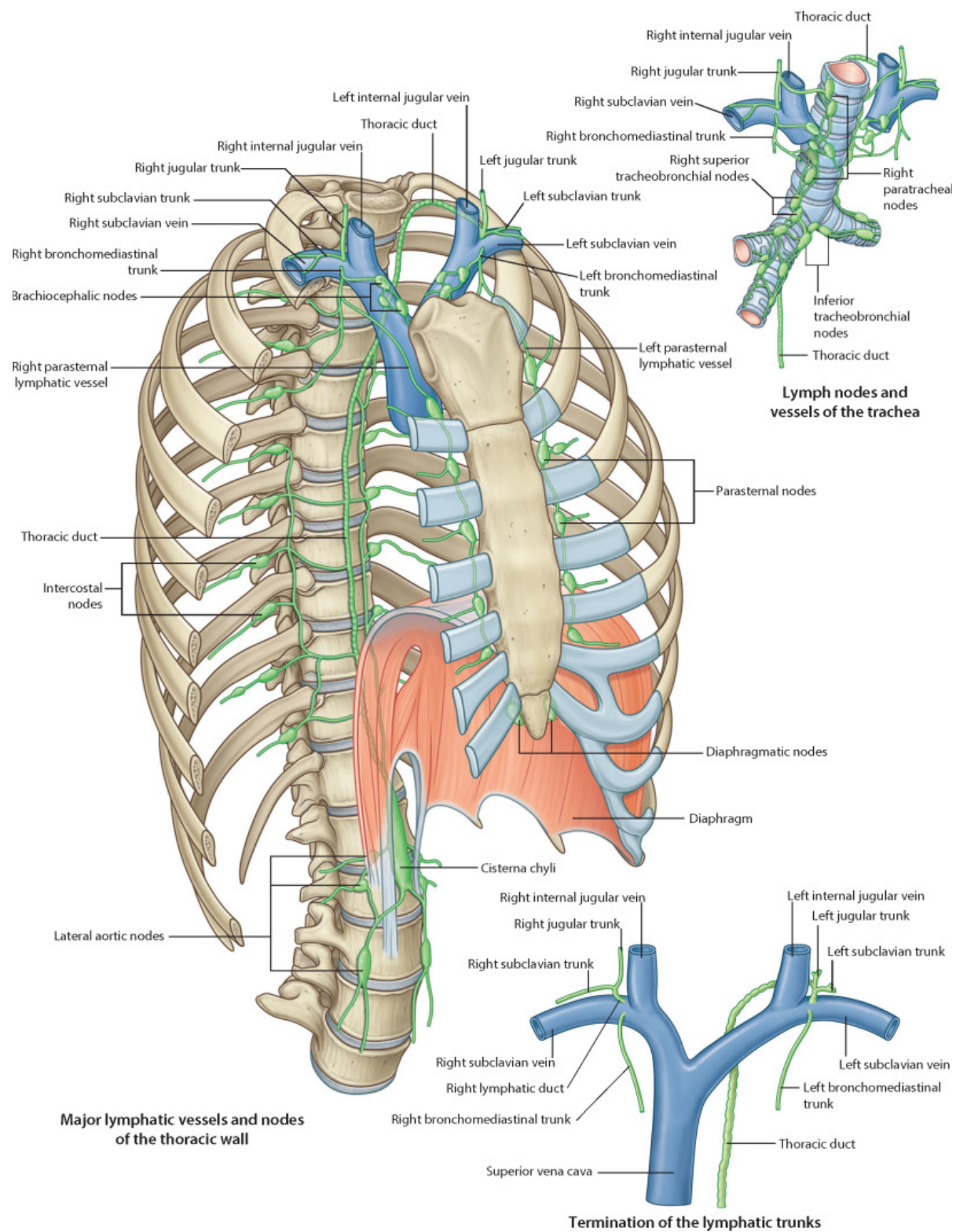
Veins of the thoracic wall



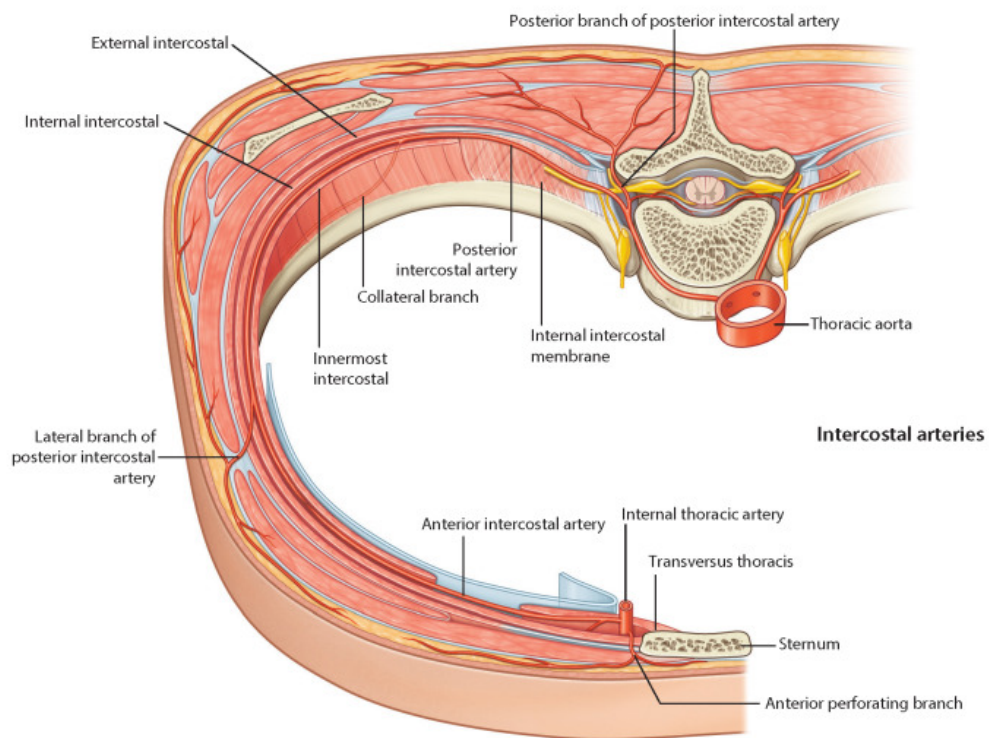
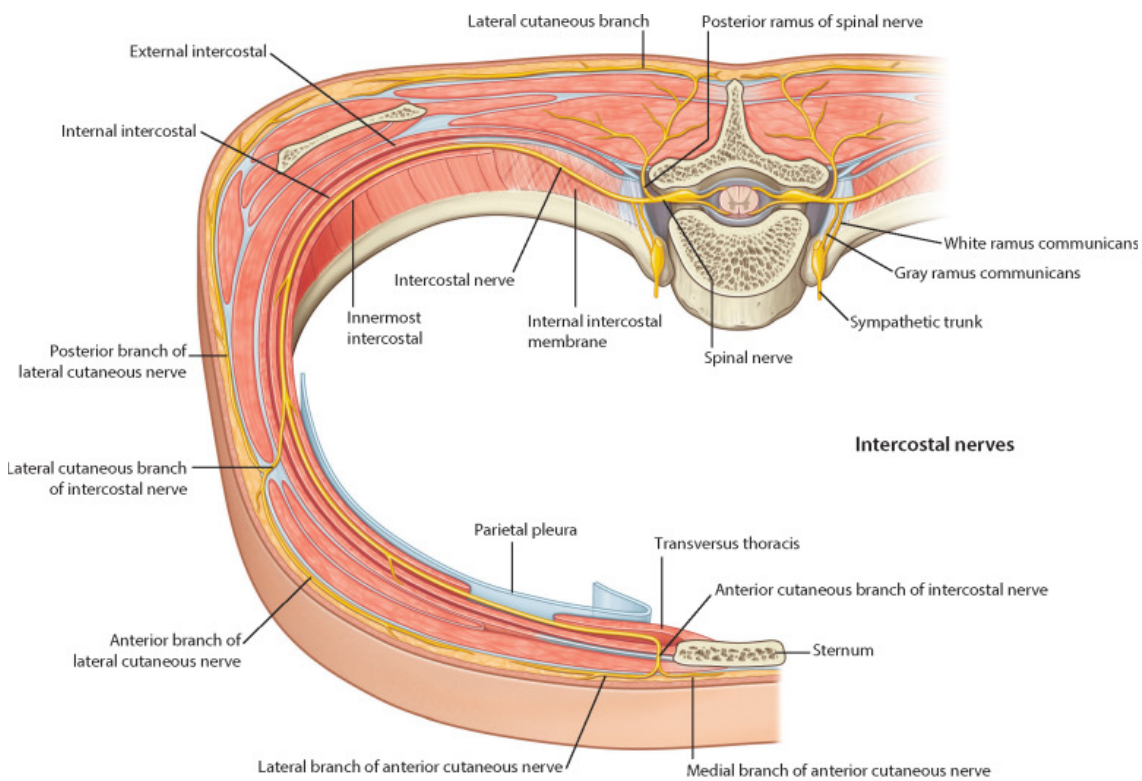
Nerves of the thoracic wall



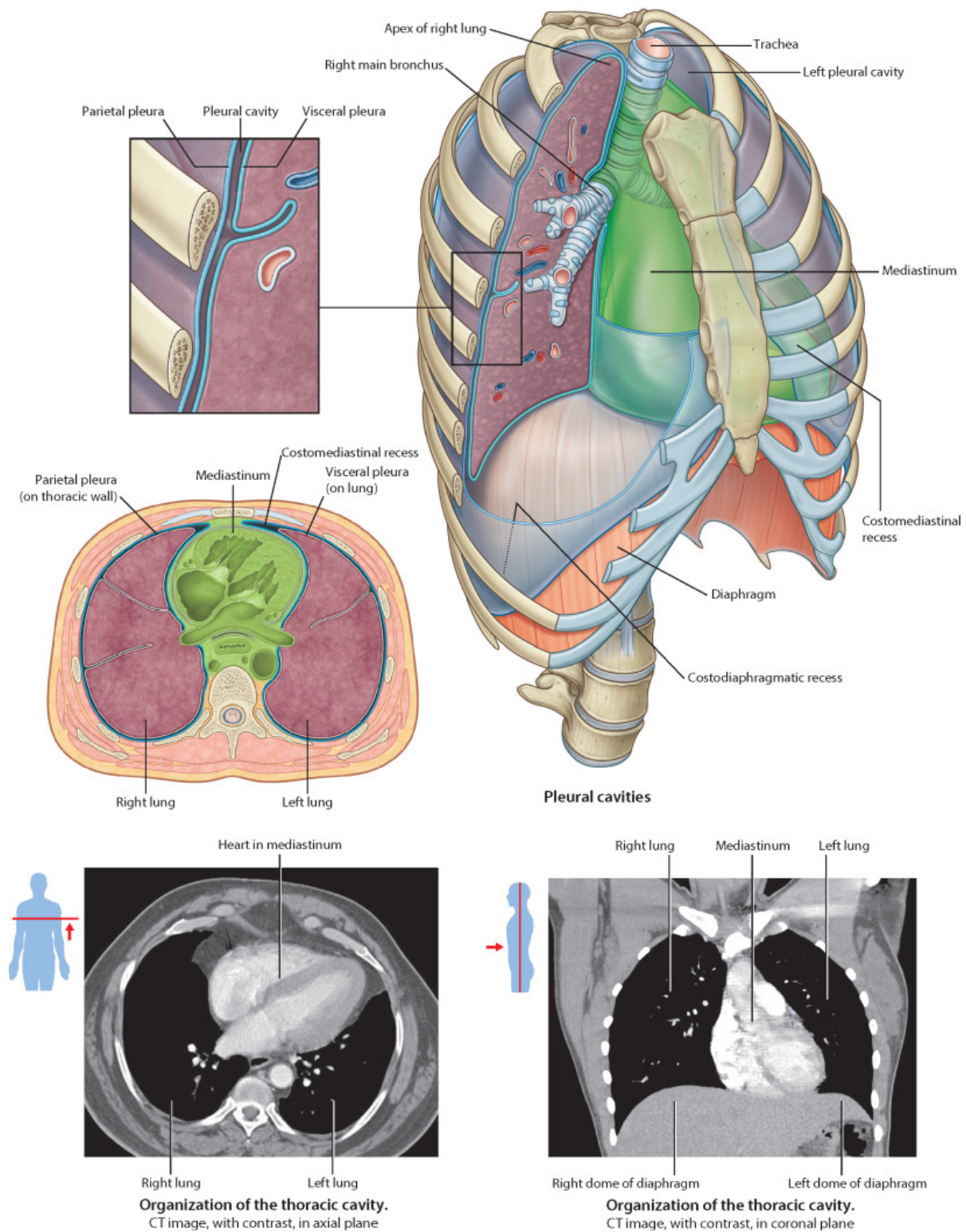
Lymphatics of the thoracic wall



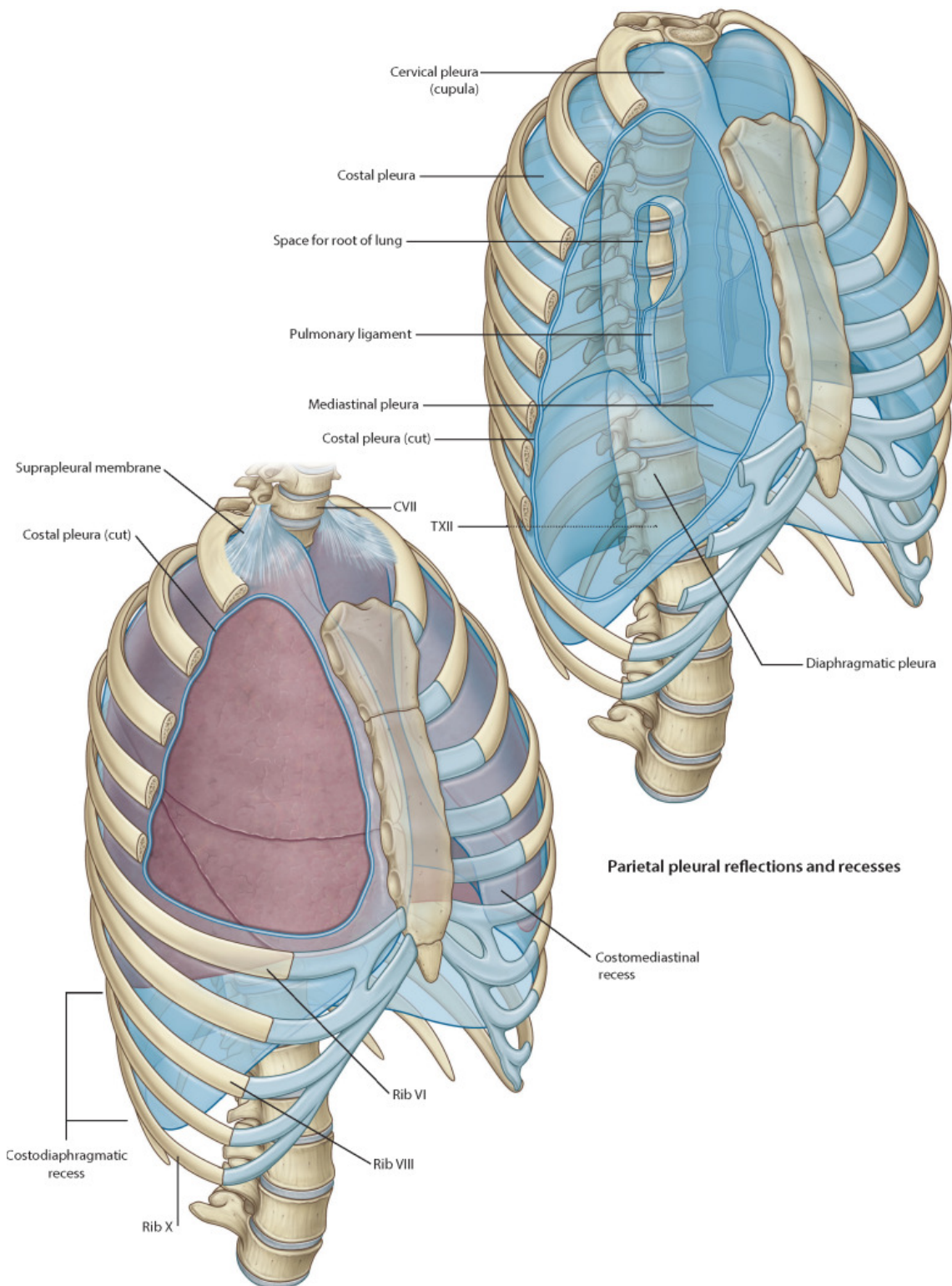
Intercostal nerves and arteries



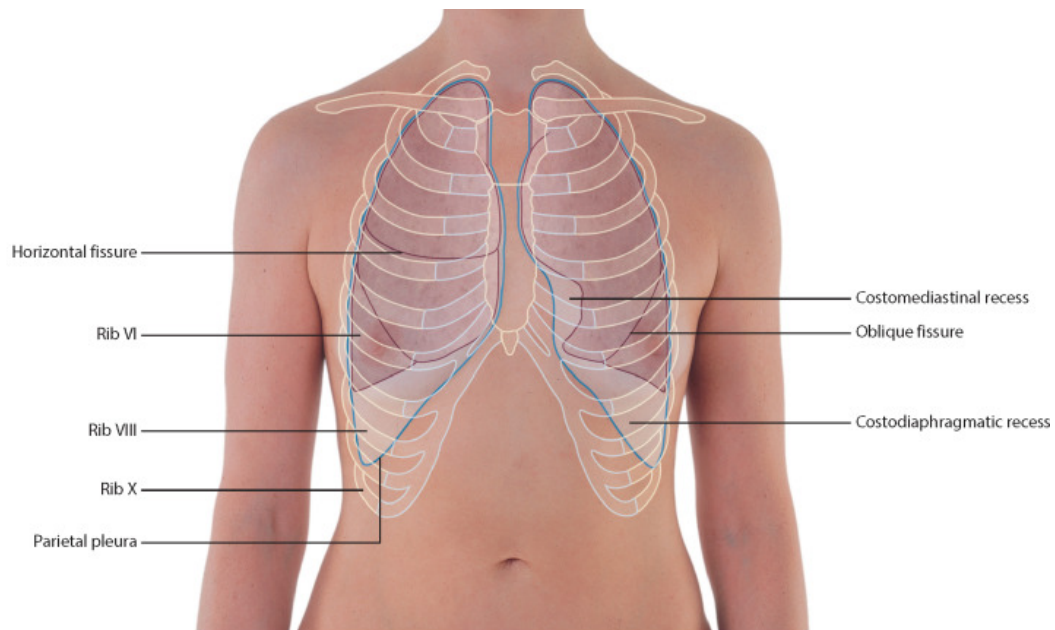
Pleural cavities and mediastinum



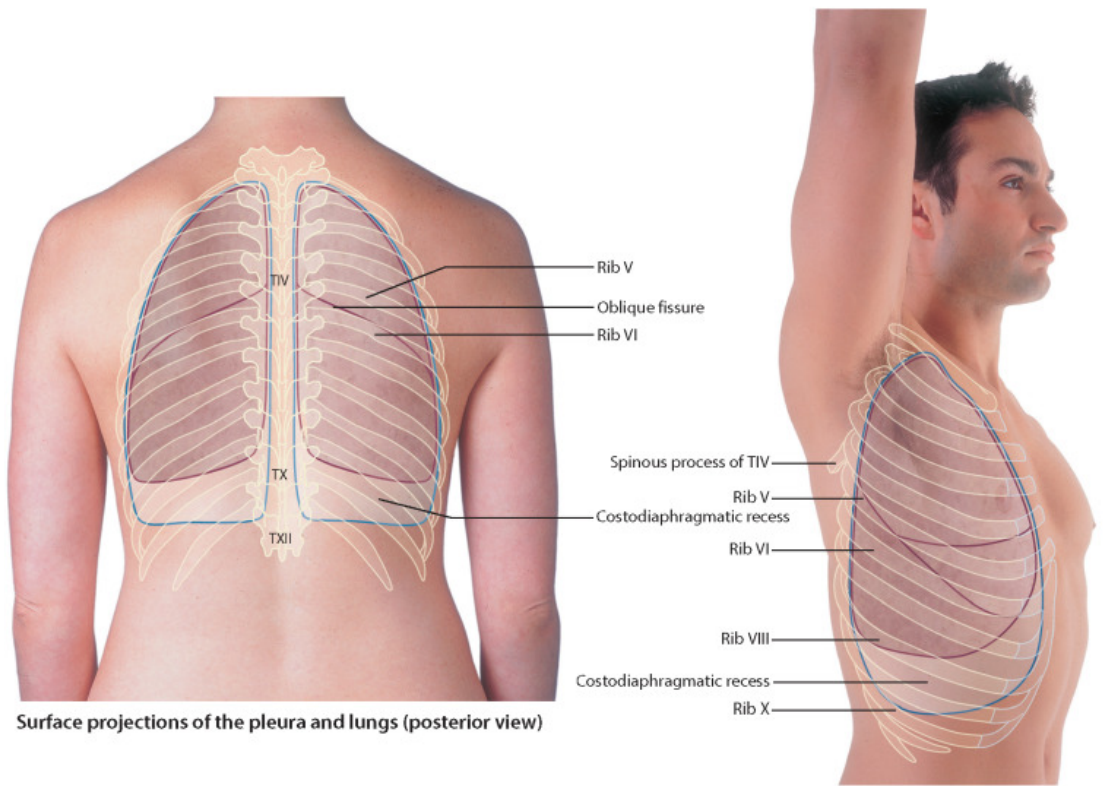
Parietal pleura



Surface projections of pleural recesses



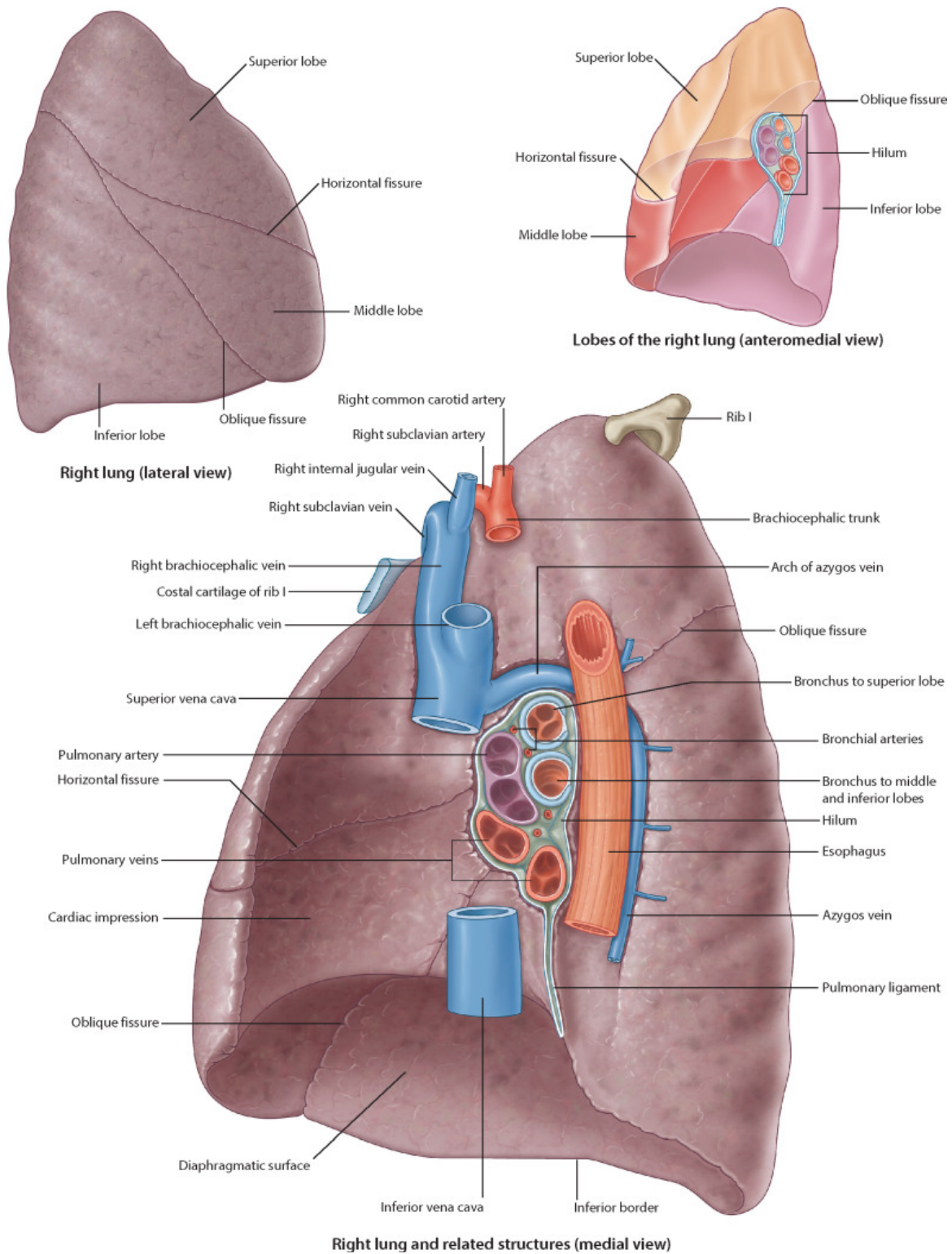
Surface projections of the pleura and lungs (anterior view)



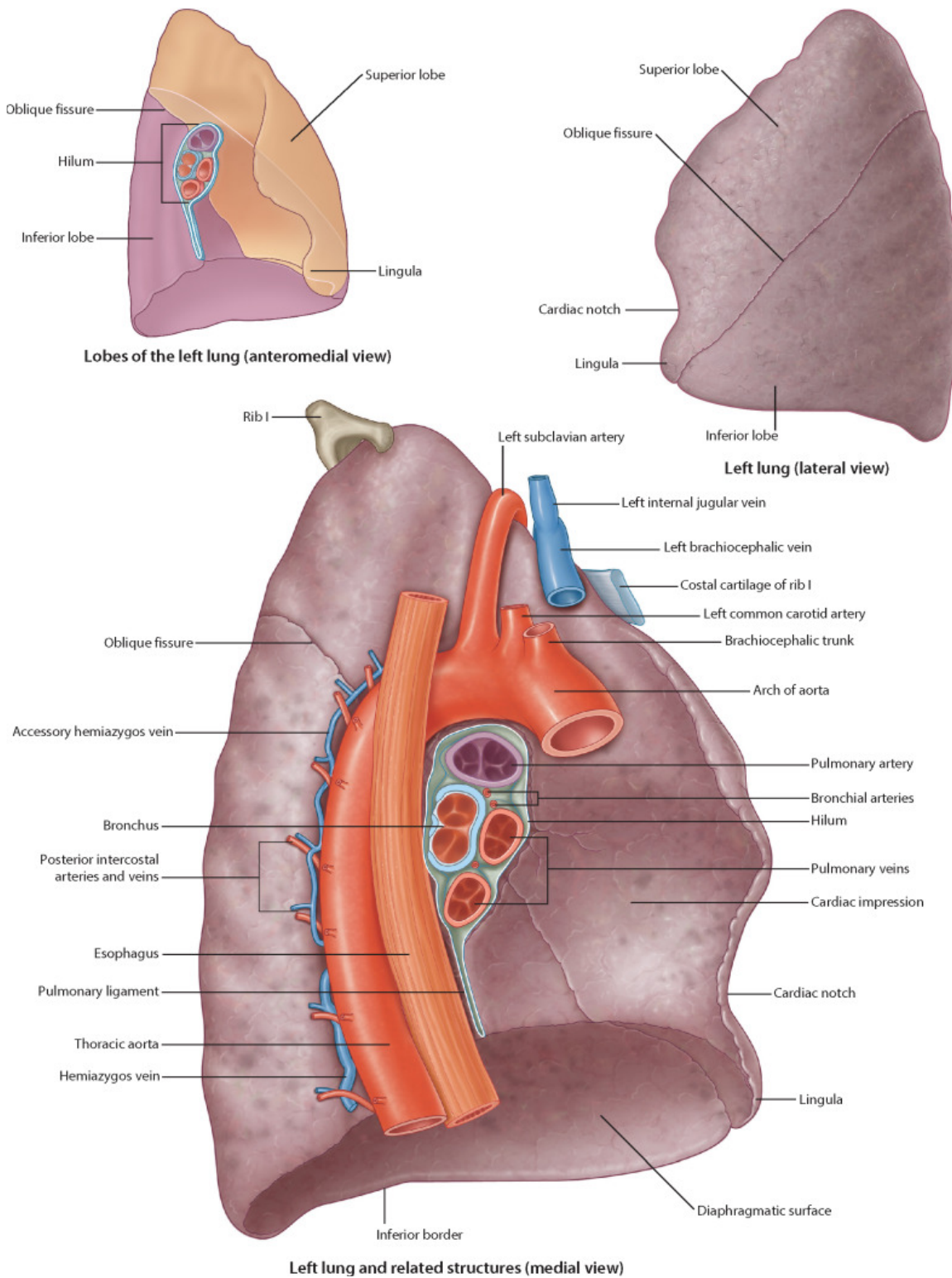
Surface projections of the pleura and lungs (posterior view)

Surface projections of the pleura and right lung (lateral view)

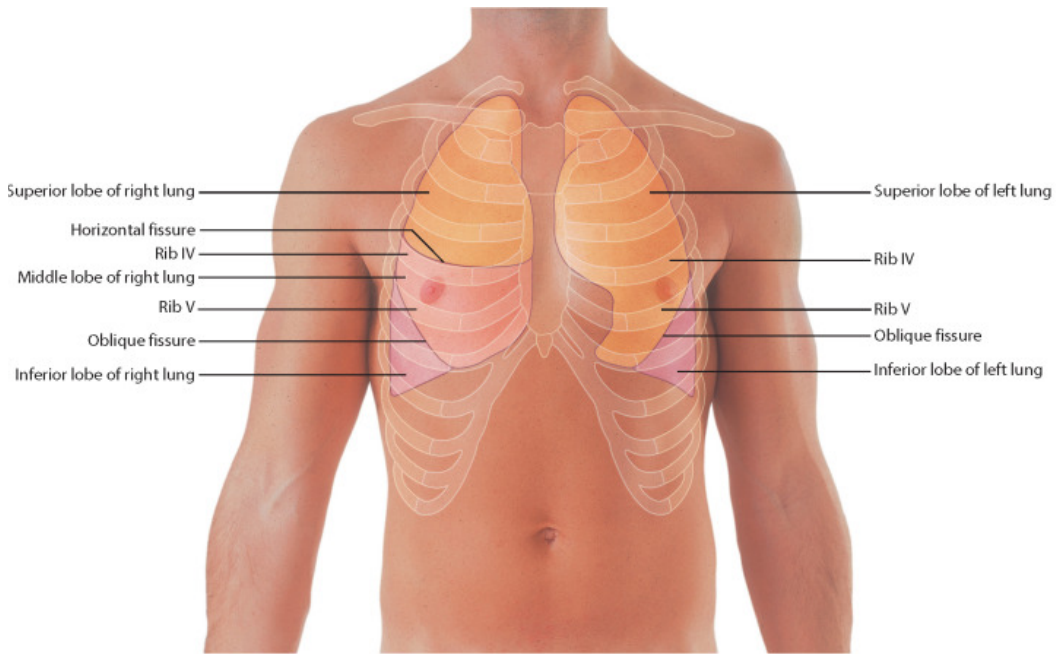
Right lung



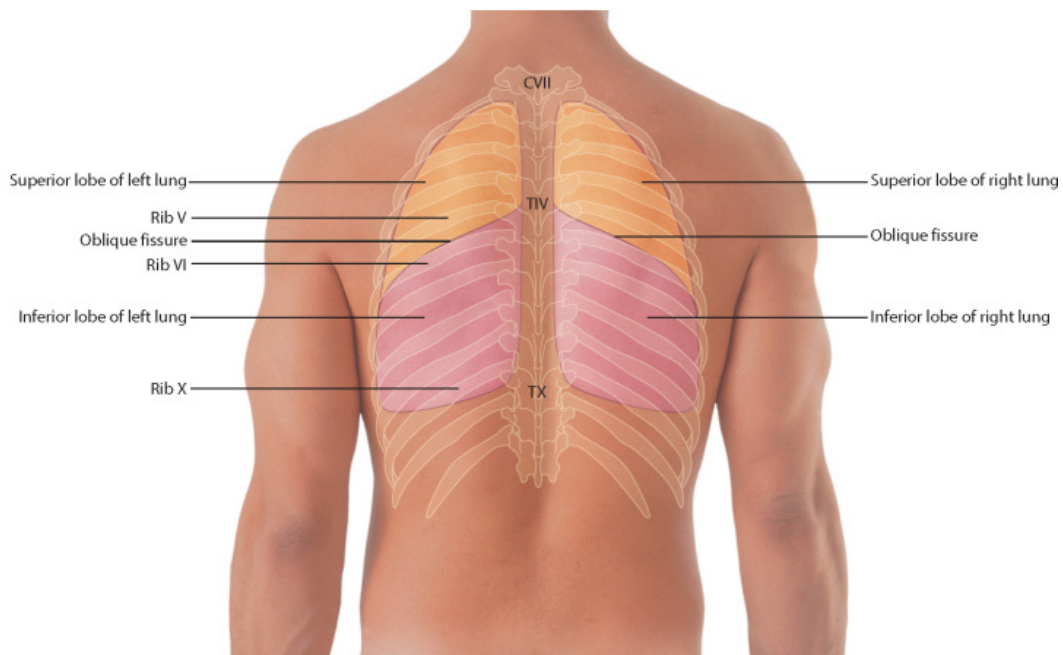
Left lung



Lung lobes: surface relationship

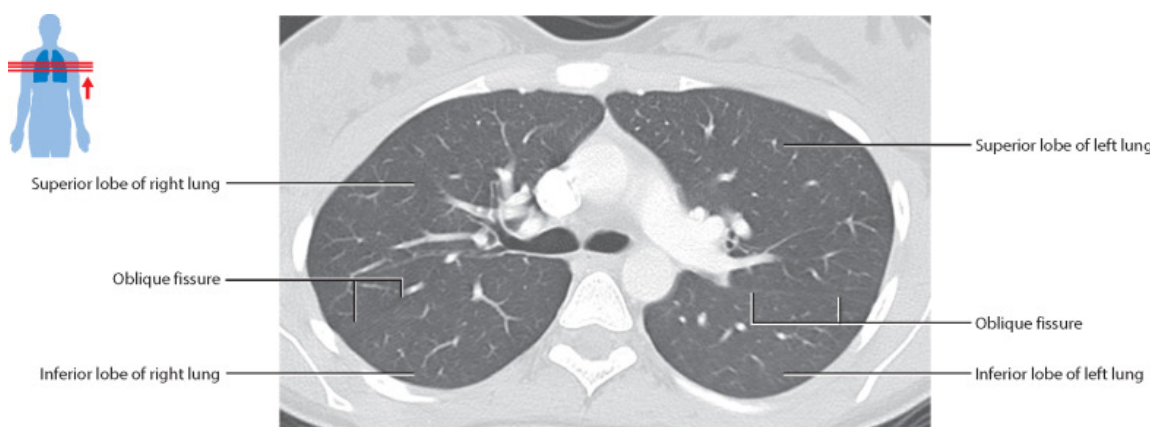


Surface projections of the lobes and fissures of the lungs (anterior view)

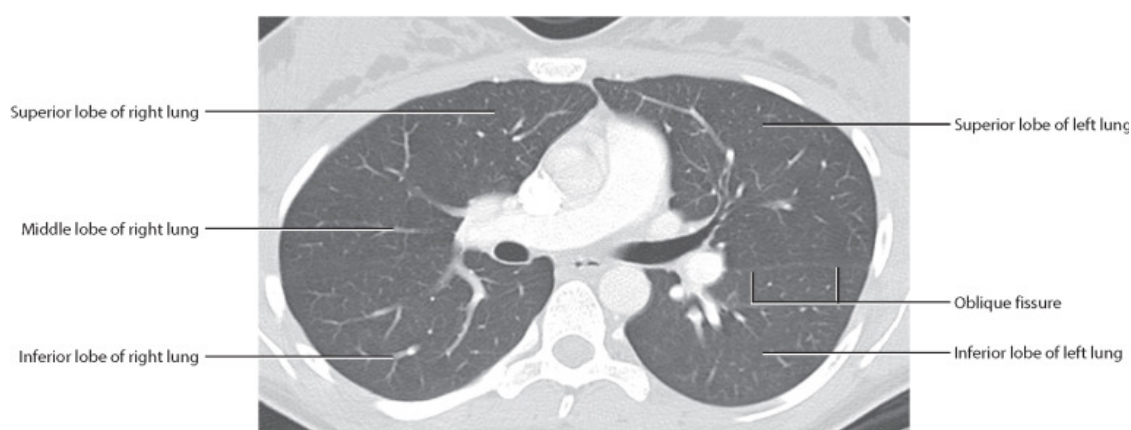


Surface projections of the lobes and fissures of the lungs (posterior view)

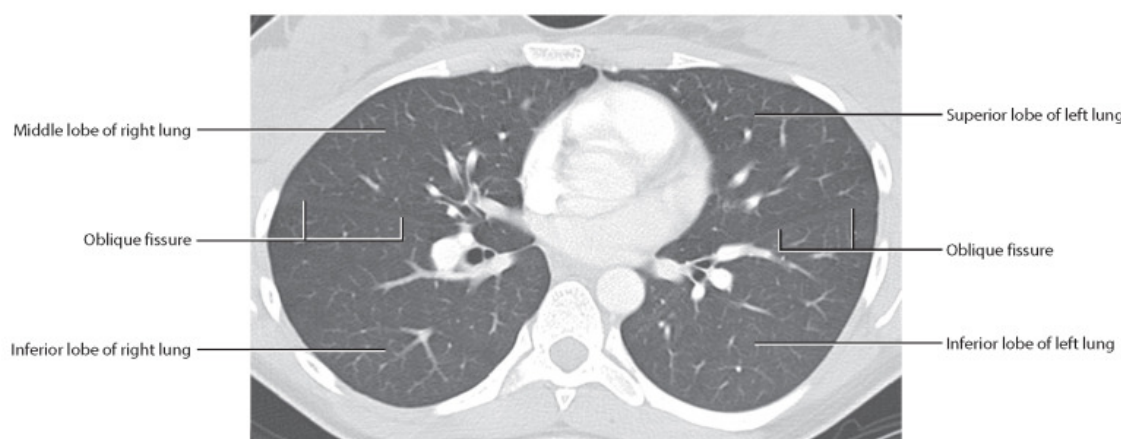
Lung lobes: imaging



Right lung and left lung demonstrating superior and inferior lobes. The oblique fissures are visible
CT image, with contrast, in axial plane

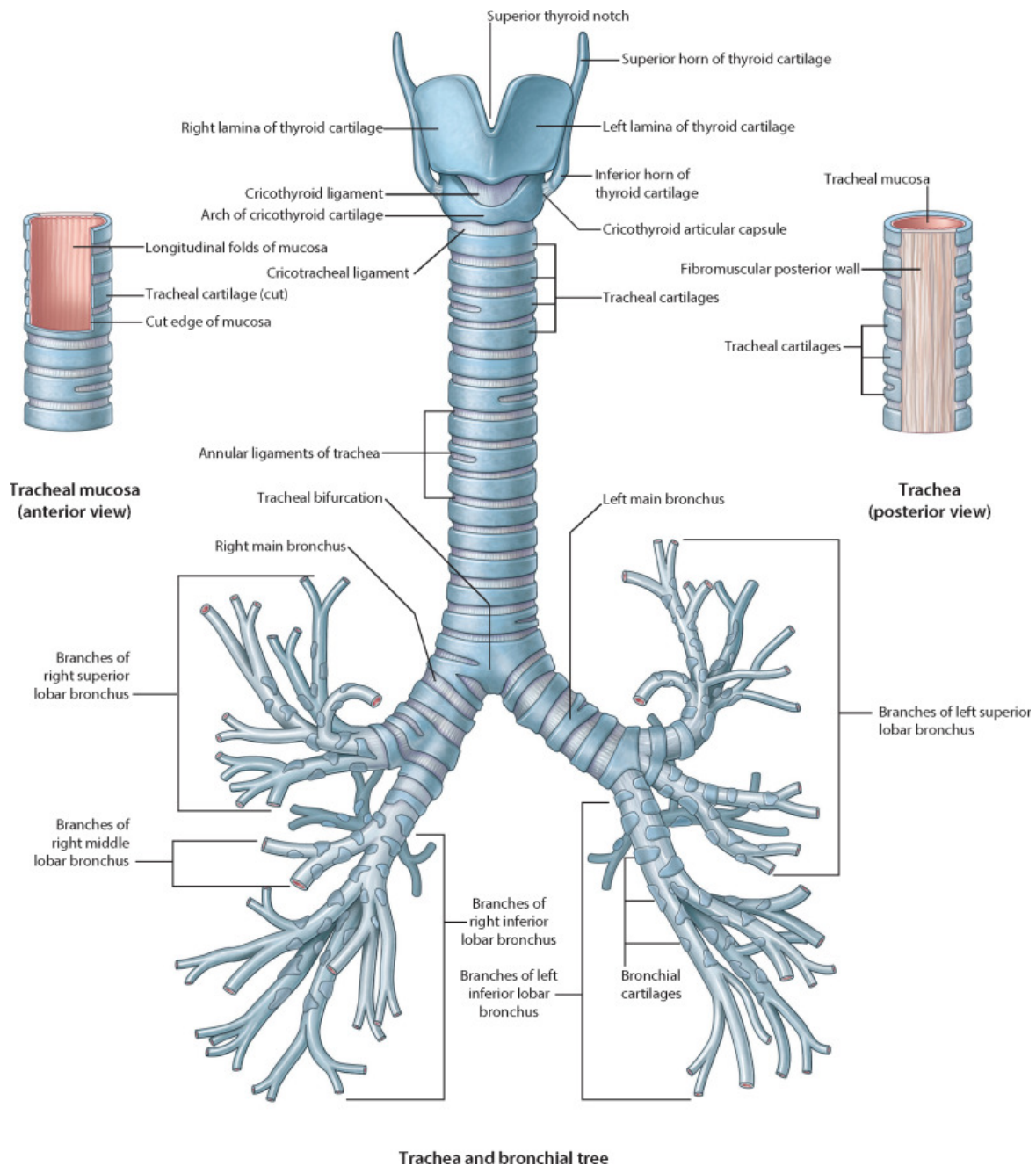


Right lung demonstrating superior, middle, and inferior lobes and the left lung demonstrating superior and inferior lobes. The oblique fissure associated with the left lung is visible.
CT image, with contrast, in axial plane

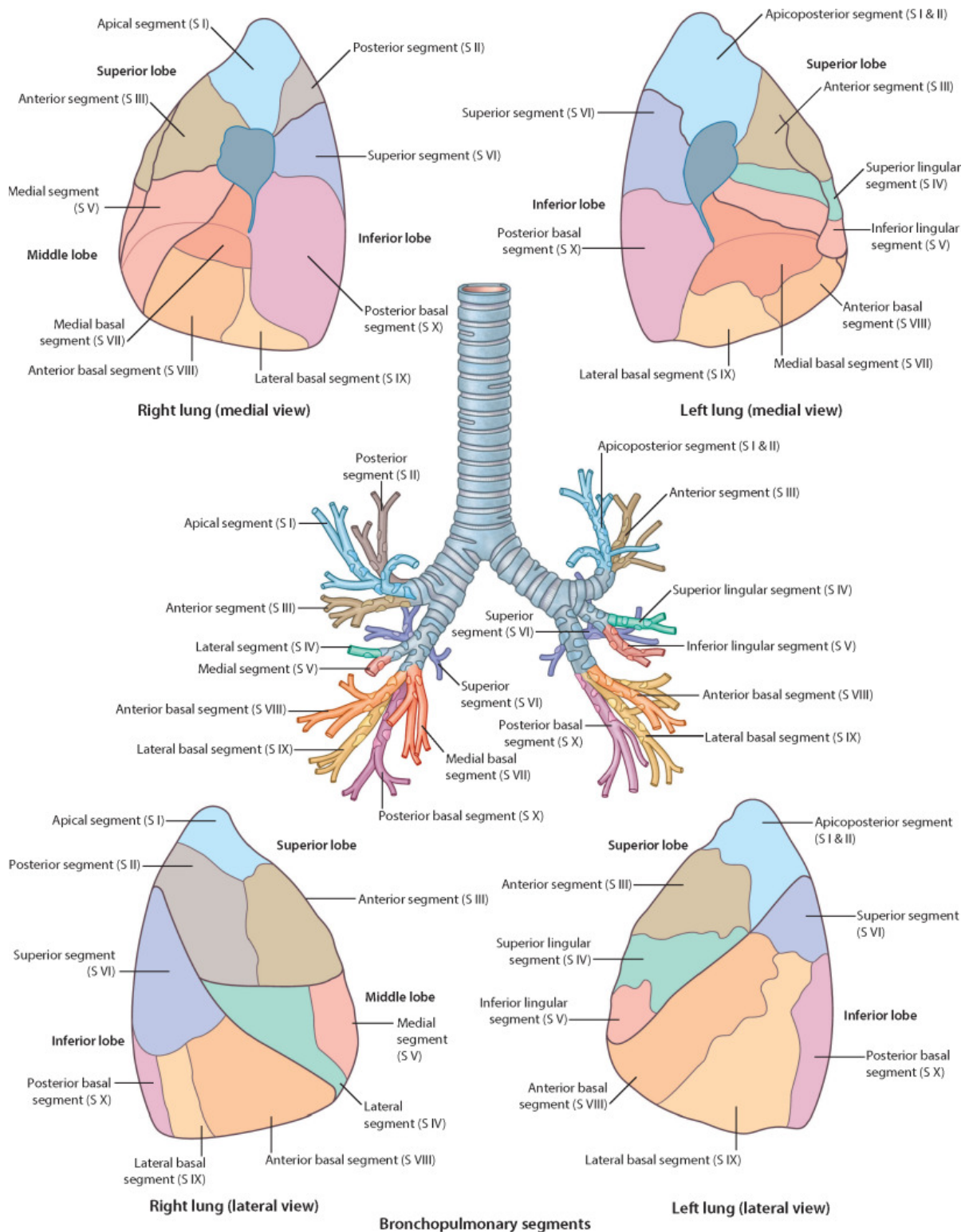


Right lung demonstrating middle and inferior lobes and the left lung demonstrating superior and inferior lobes. The oblique fissures are visible.
CT image, with contrast, in axial plane

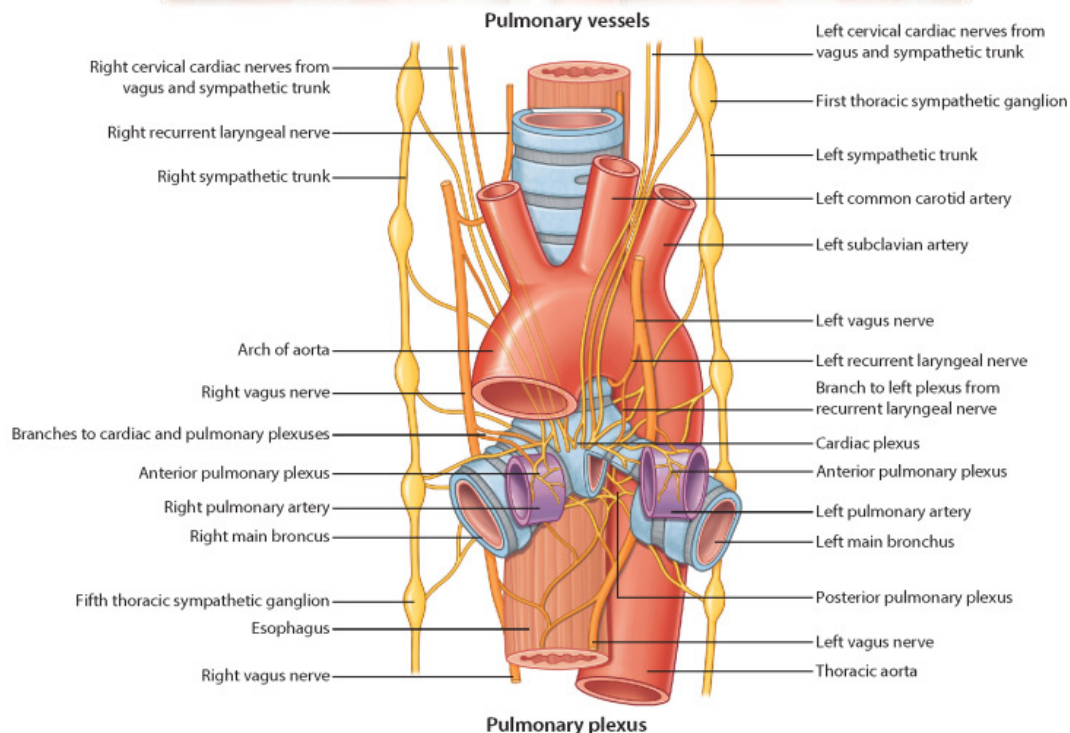
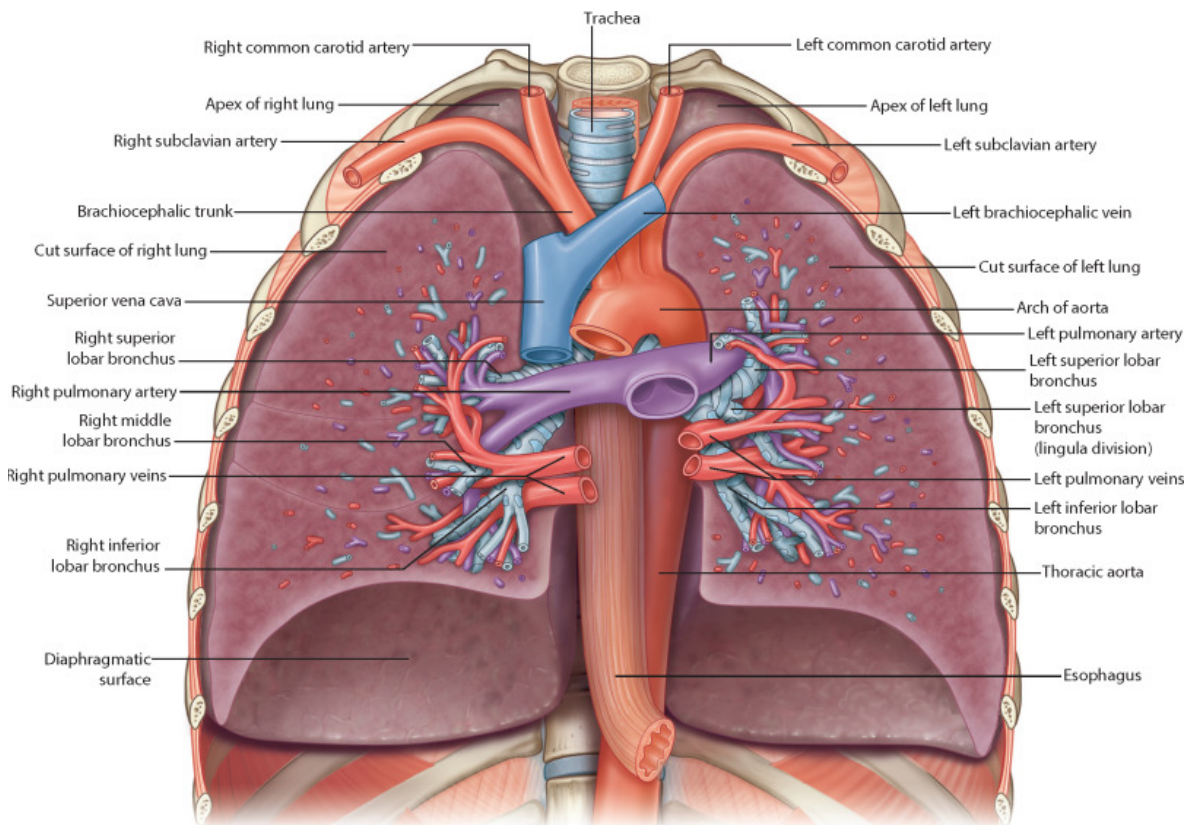
Bronchial tree



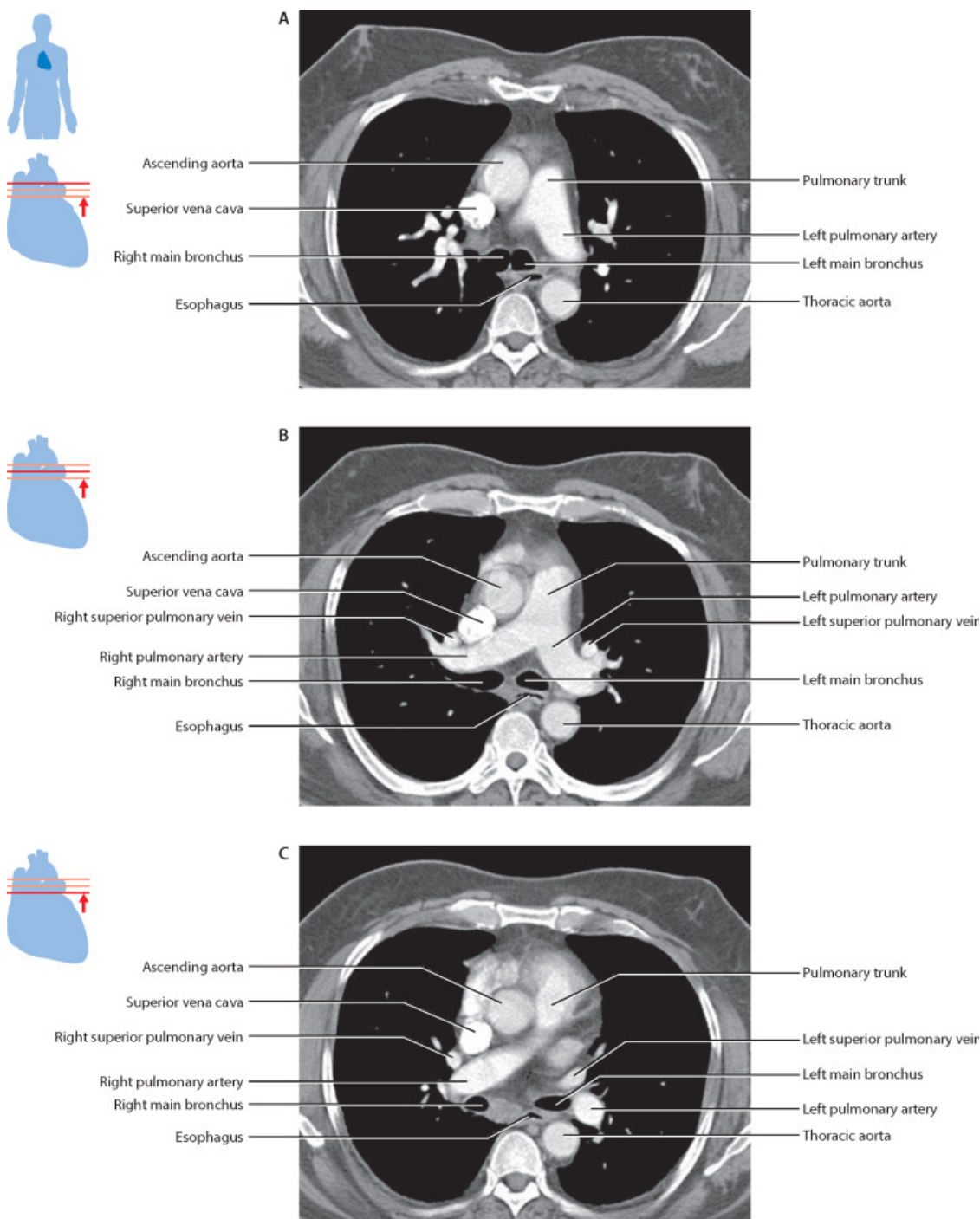
Bronchopulmonary segments



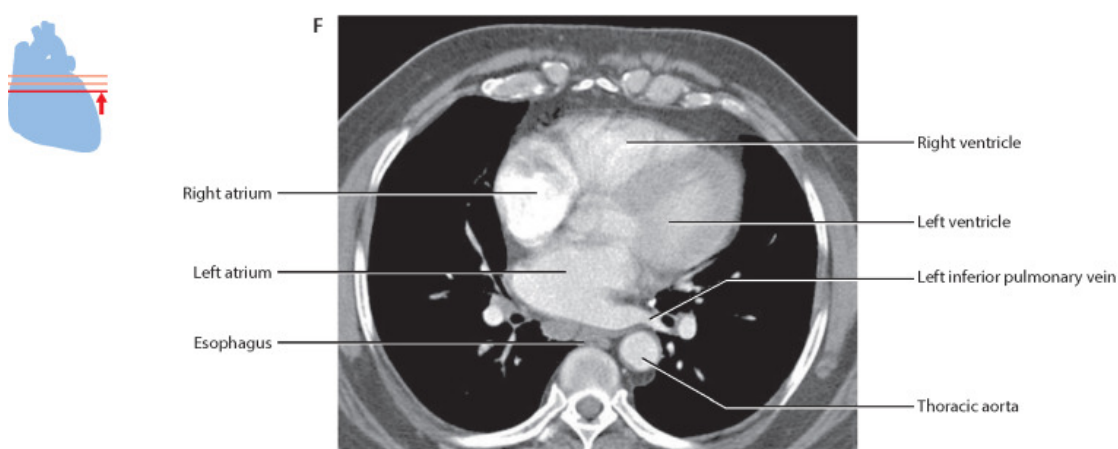
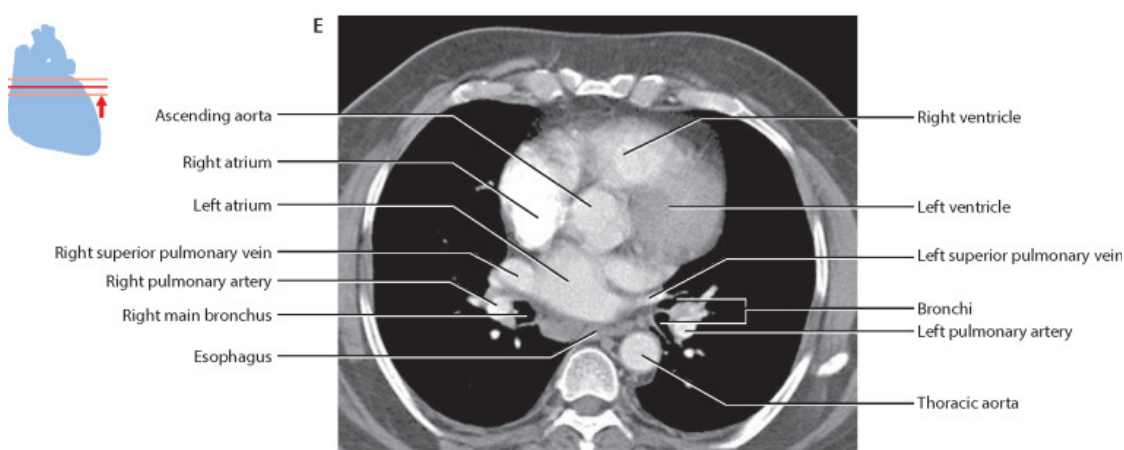
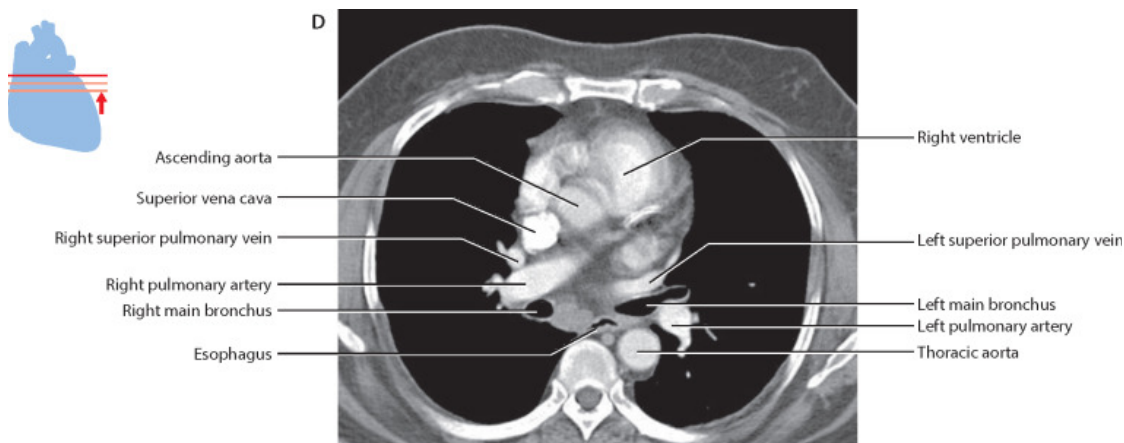
Pulmonary vessels and plexus



Pulmonary vessels: imaging

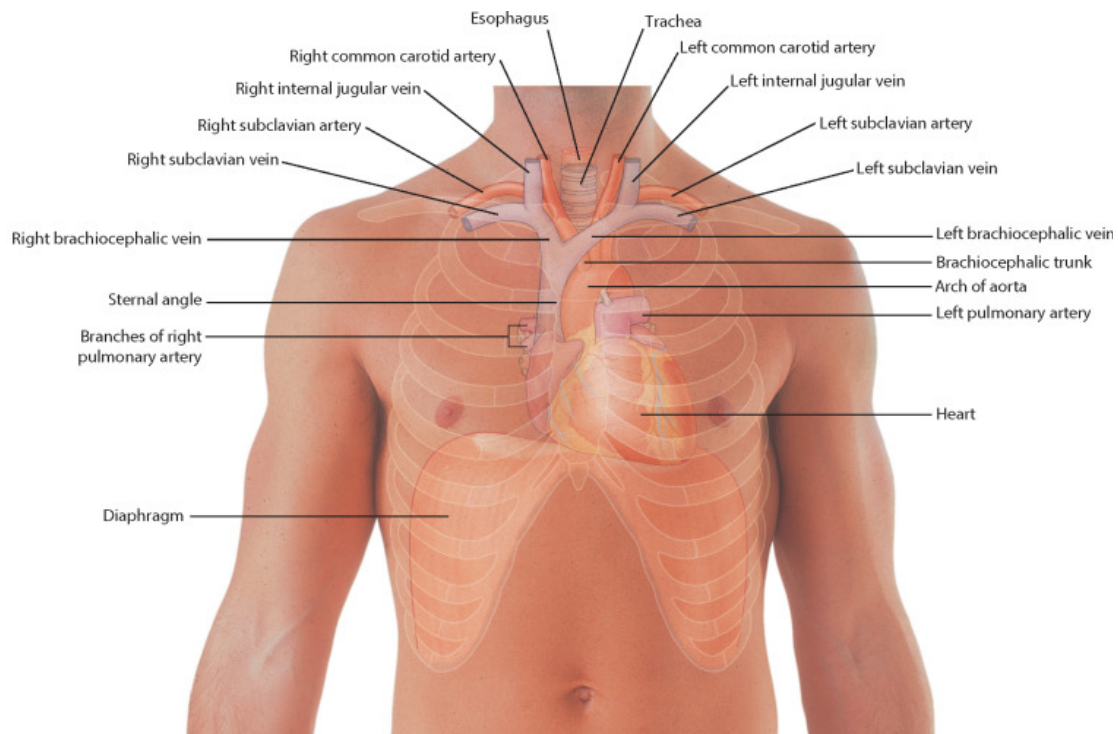


A through C – Relationships of the pulmonary arteries, pulmonary veins, and bronchi in the mediastinum.
CT images, with contrast, in axial plane

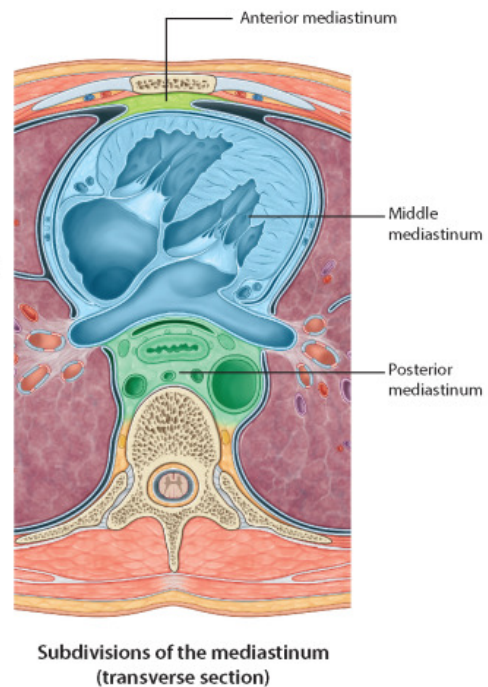
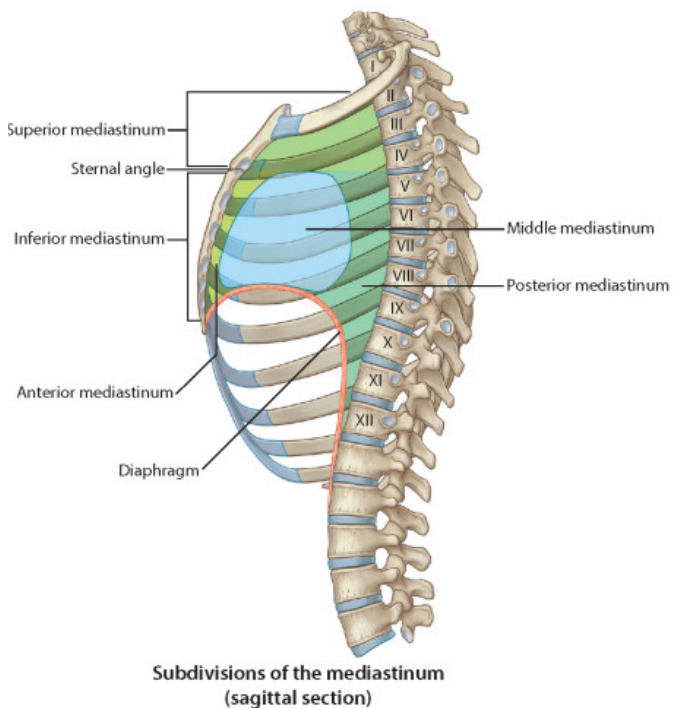


D through F – Relationships of the pulmonary arteries, pulmonary veins, and bronchi in the mediastinum.
CT images, with contrast, in axial plane

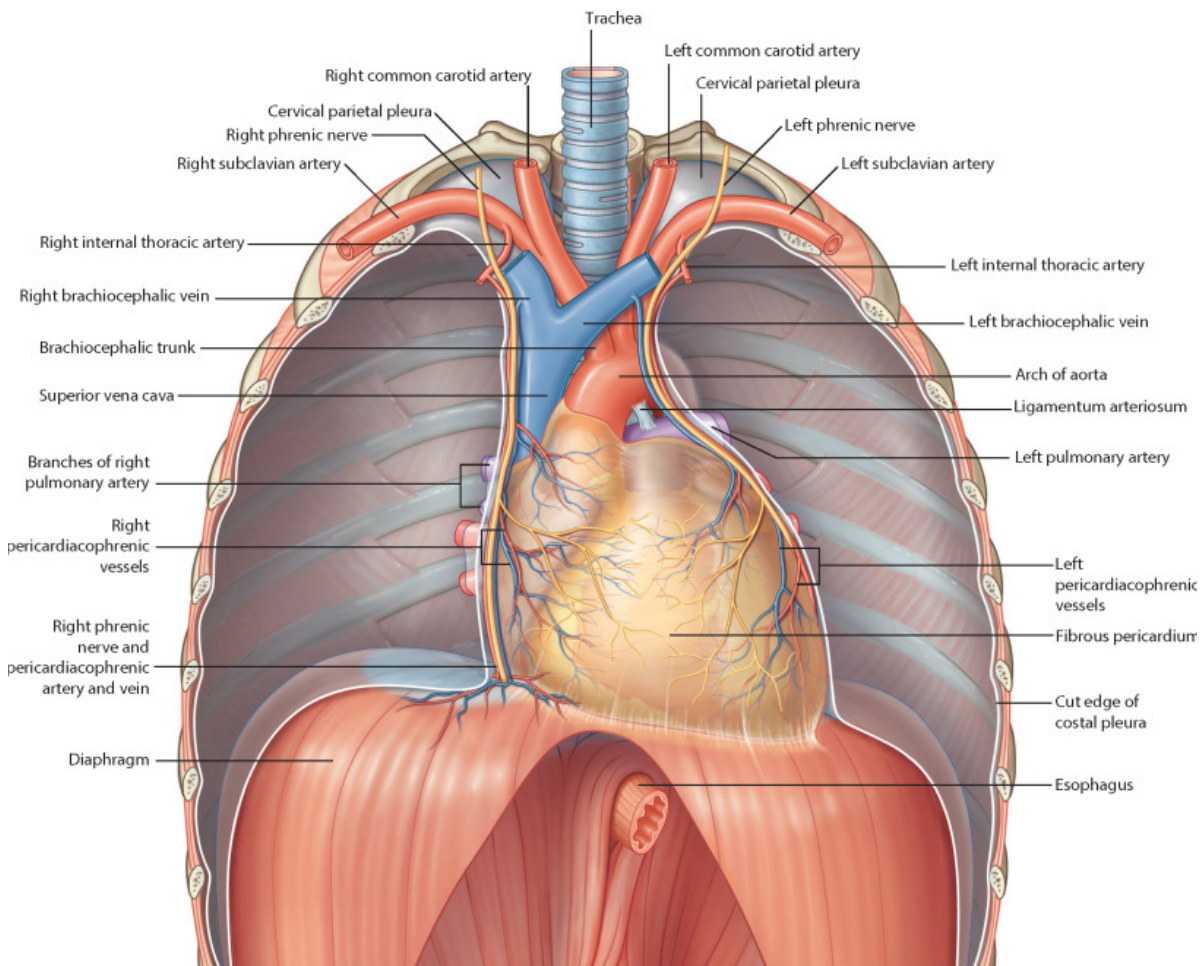
Mediastinum



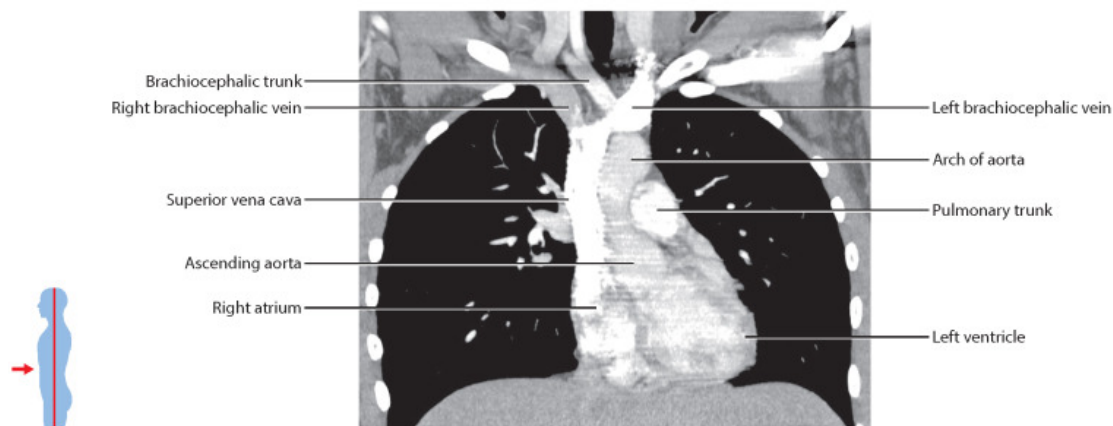
Structures of the mediastinum as they relate to the surface



Pericardium

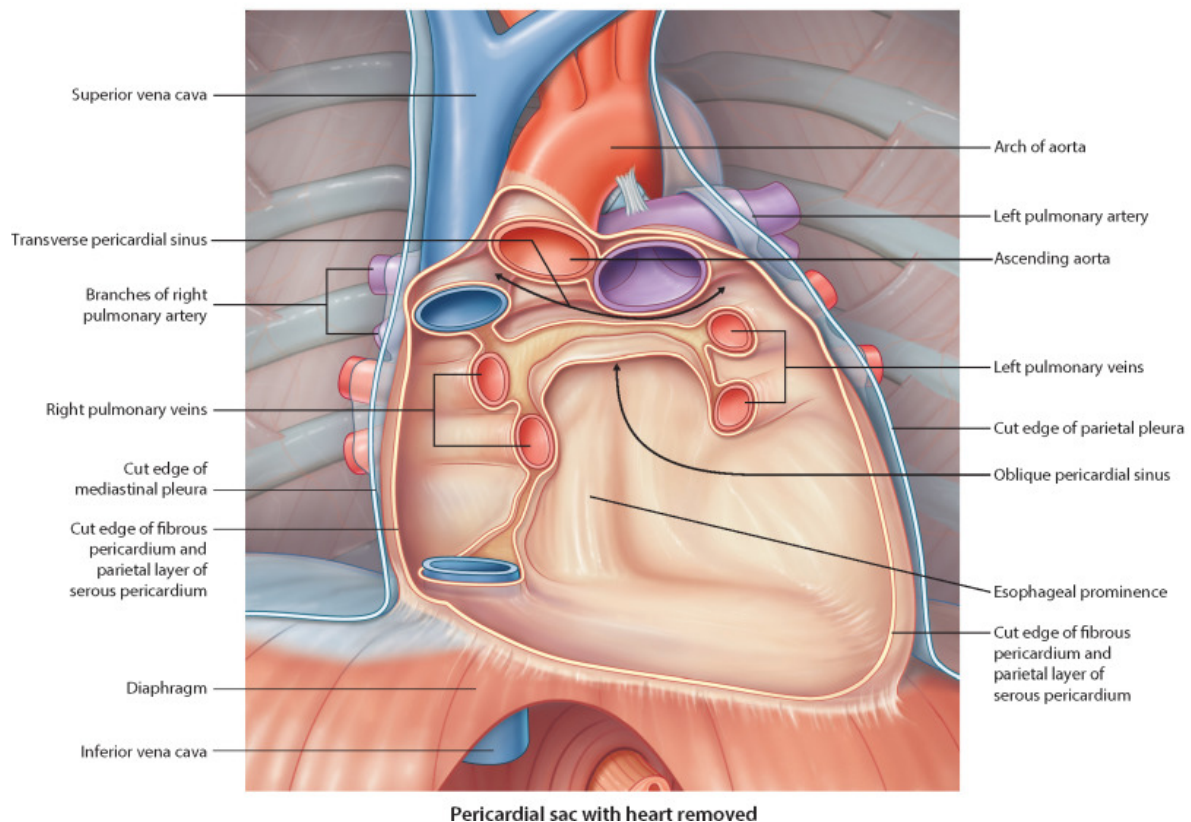
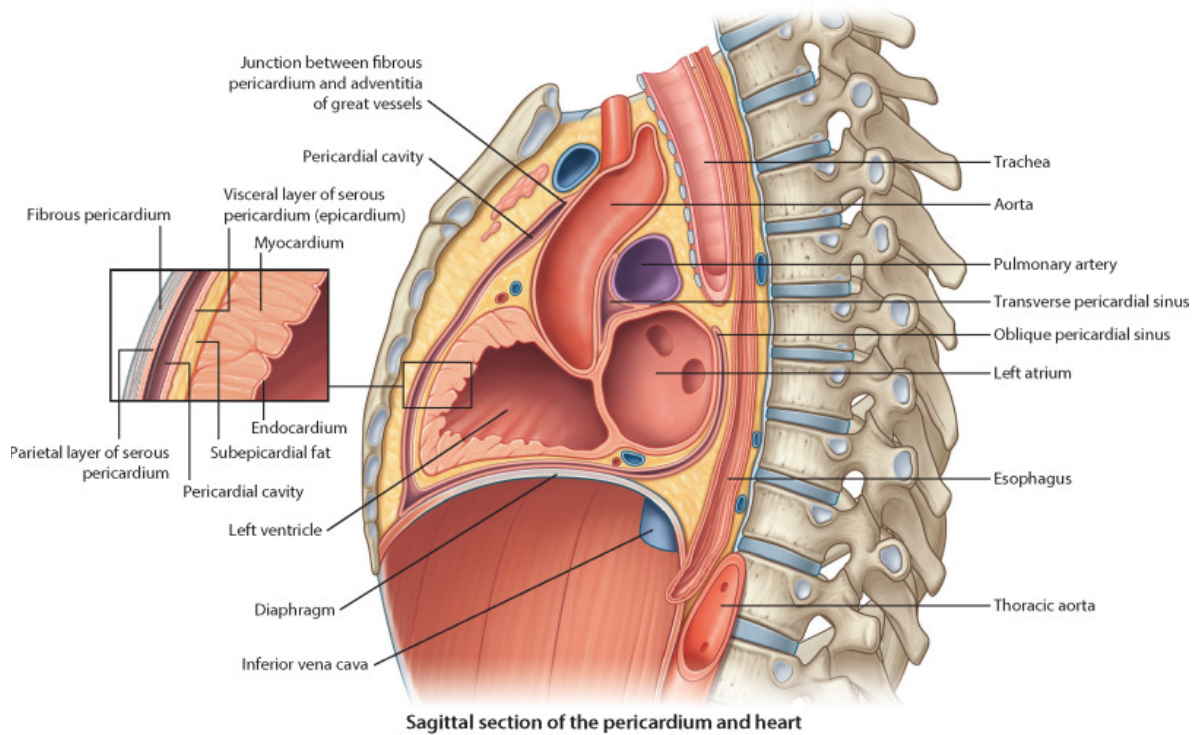


Pericardium with nerves and vessels

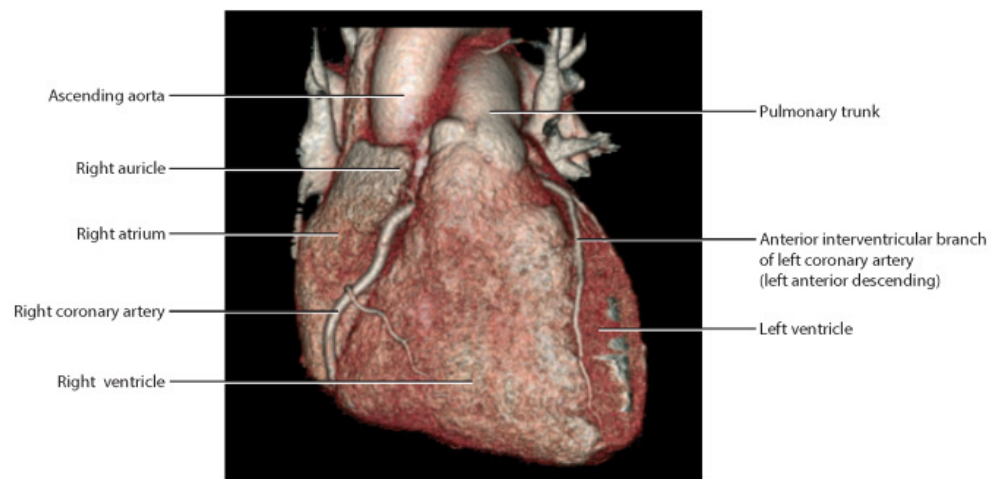
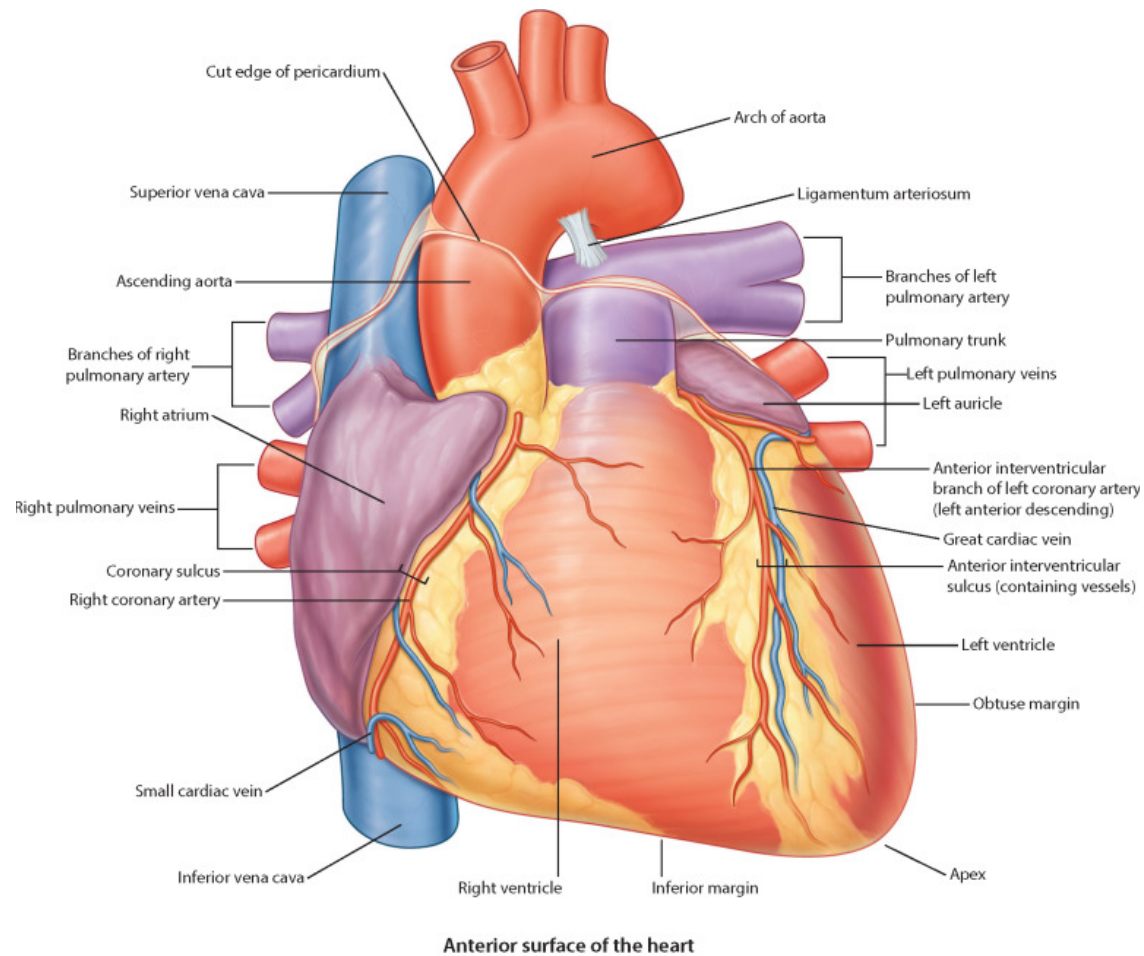


Mediastinal structures and lungs.
CT image, with contrast, in coronal plane

Pericardial layers

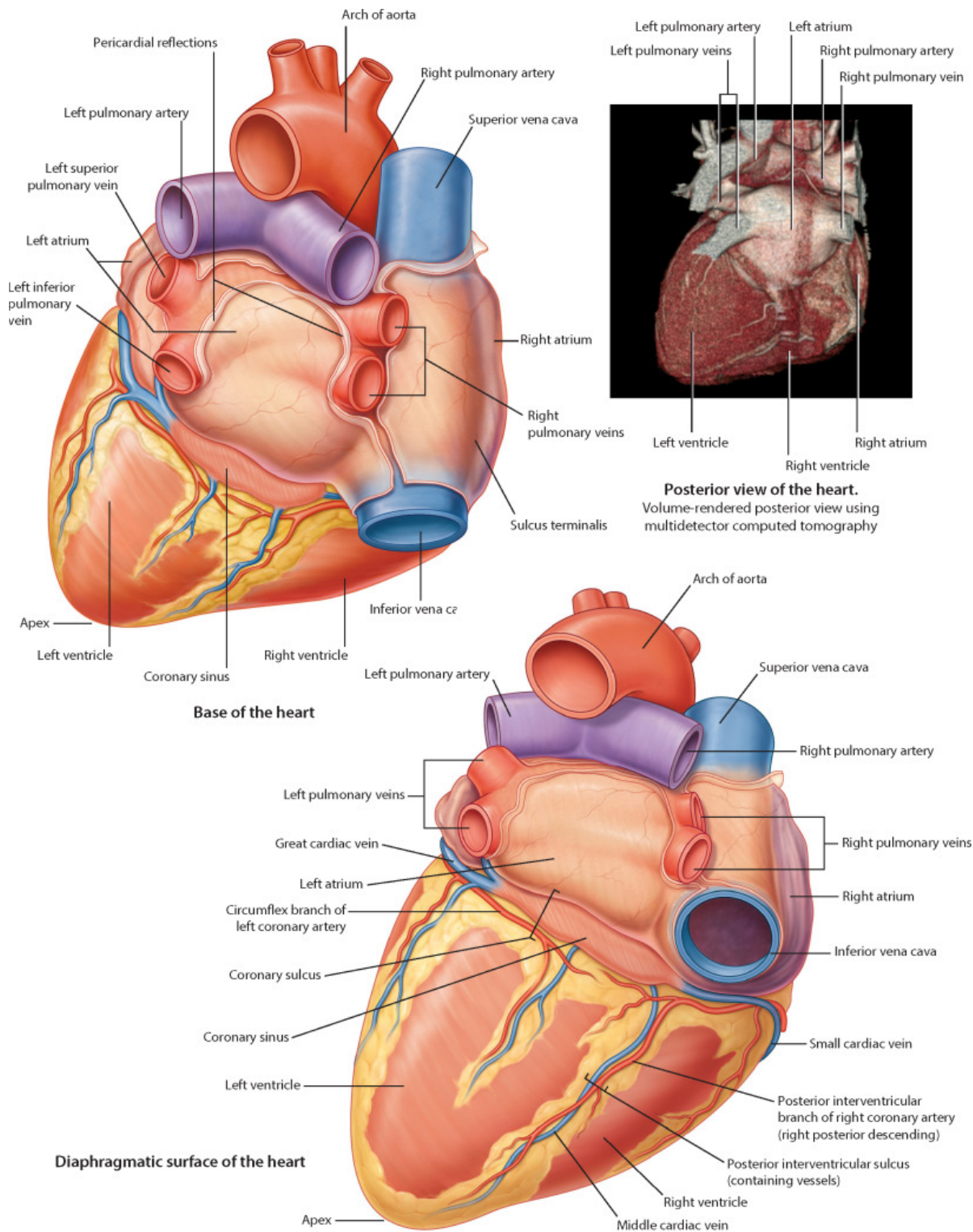


Anterior surface of heart

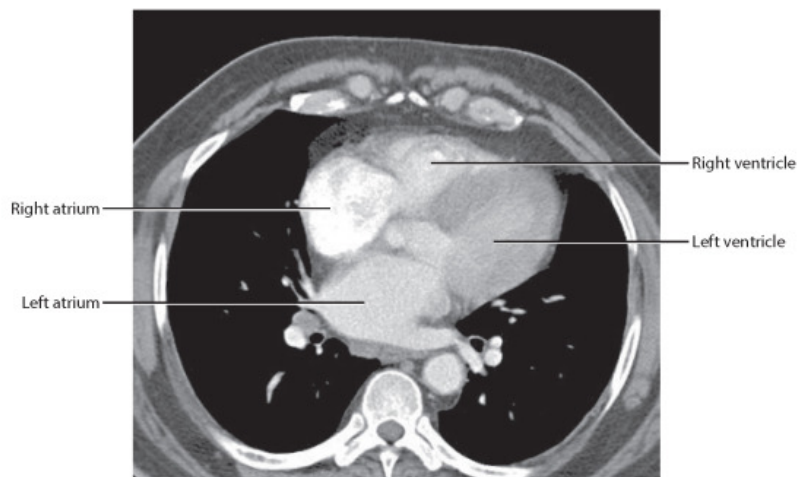
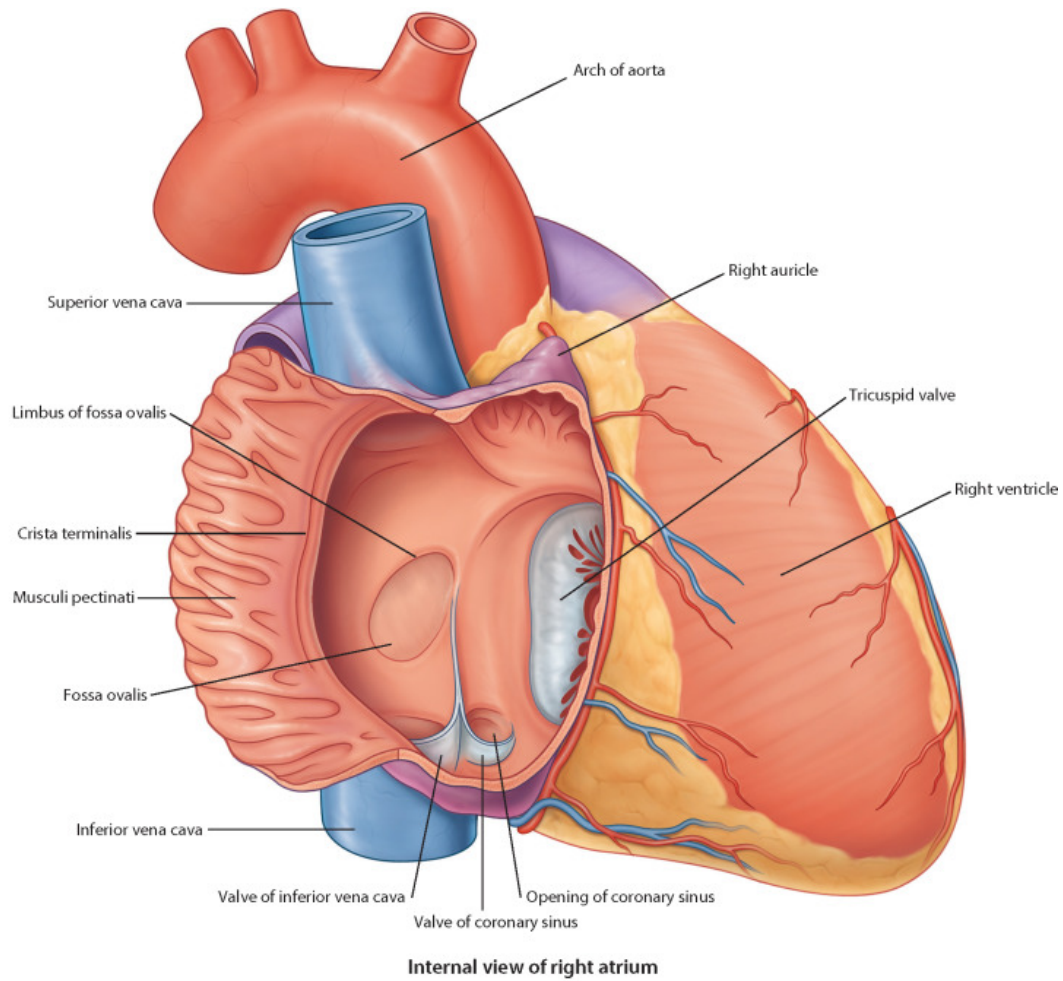


Anterior view of the heart.
Volume-rendered anterior view using multidetector computed tomography

Base and diaphragmatic surface of heart

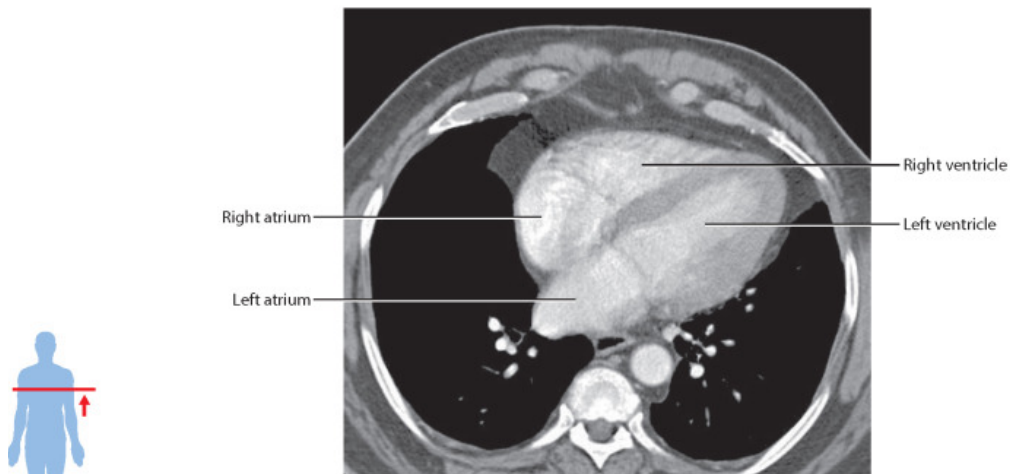
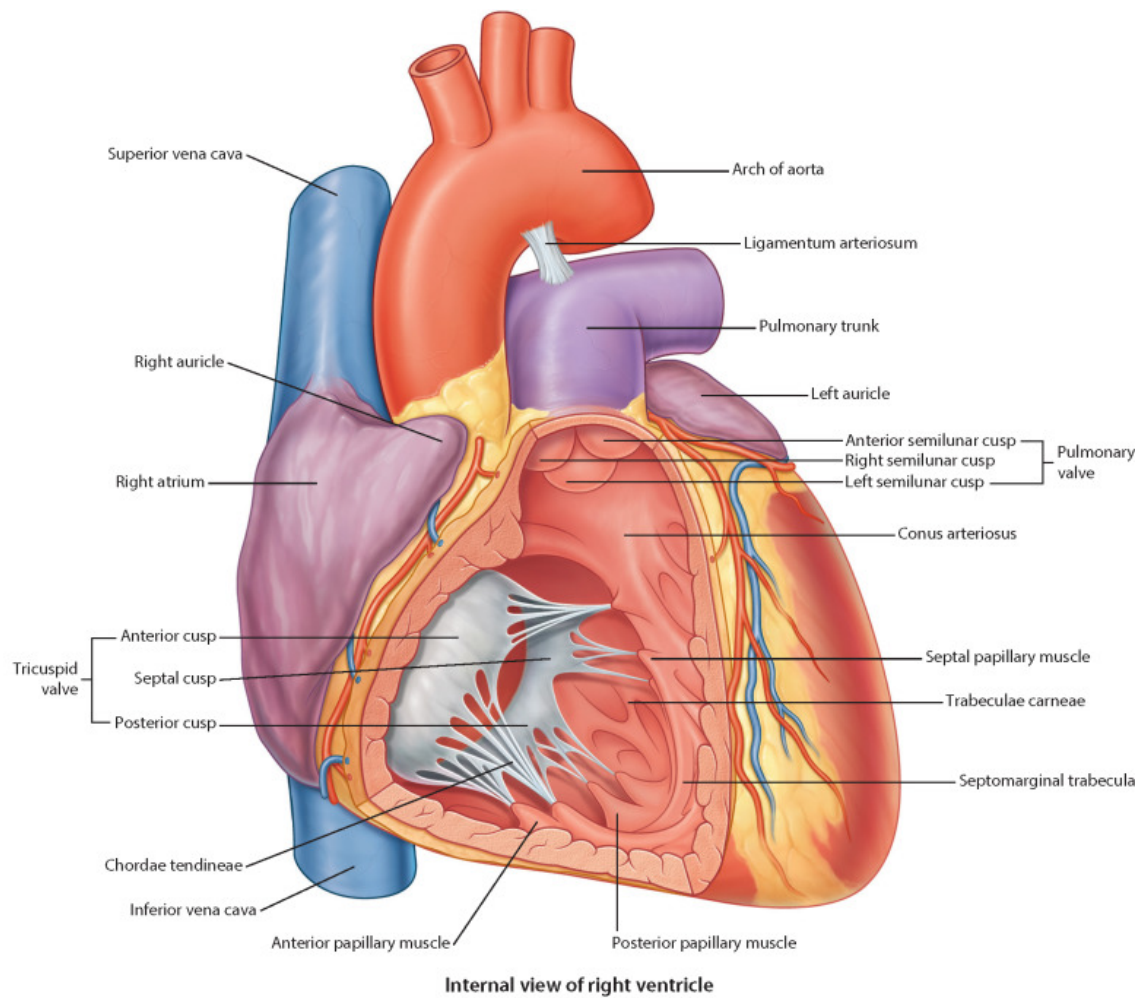


Right atrium



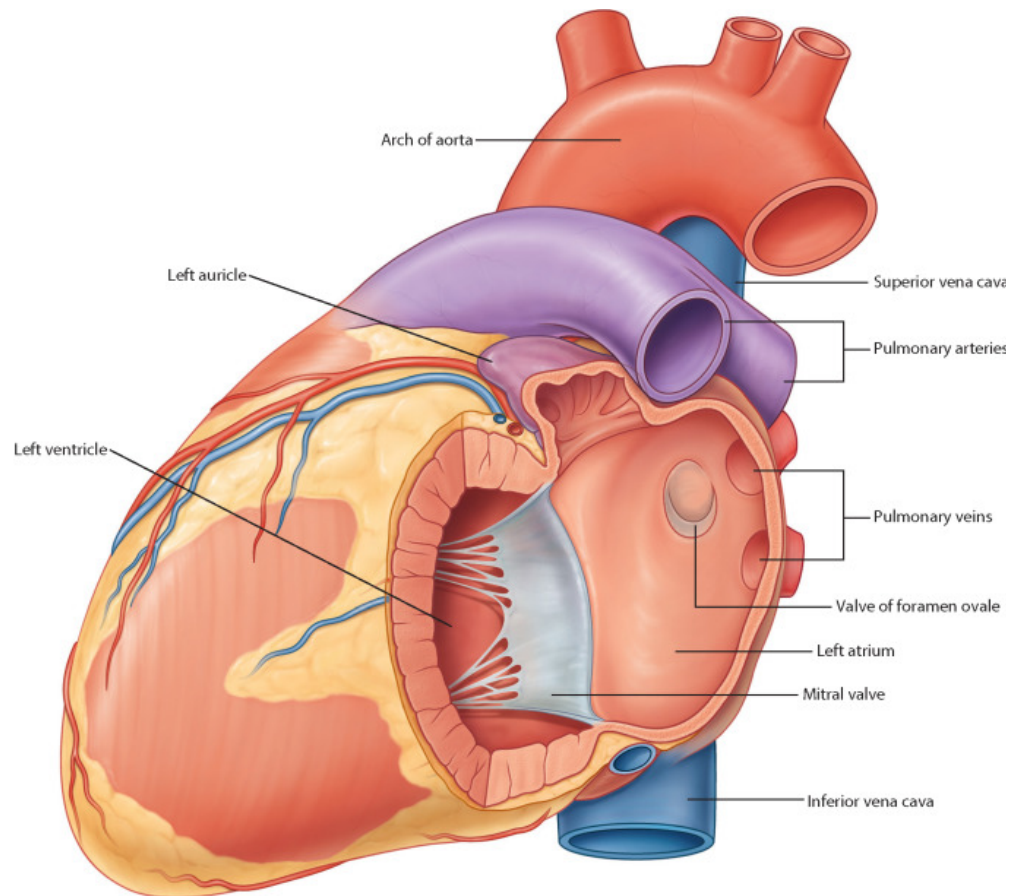
Positioning of right atrium in relation to other cardiac chambers.
CT image, with contrast, in axial plane

Right ventricle

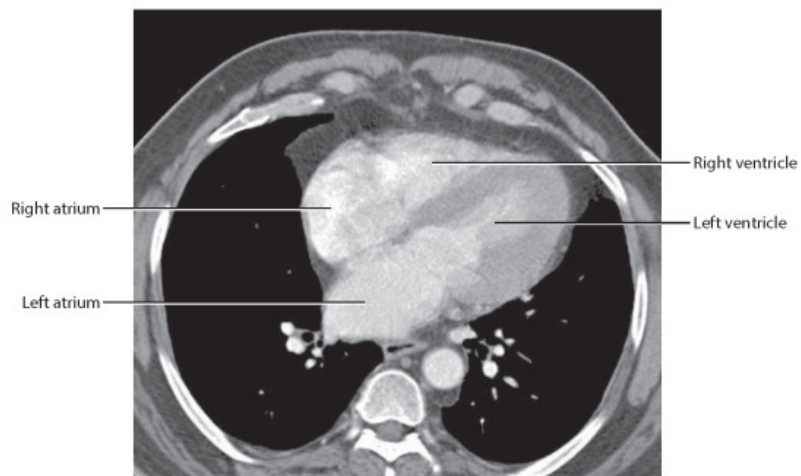


Positioning of right ventricle in relation to other cardiac chambers.
CT image, with contrast, in axial plane

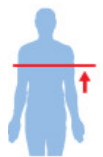
Left atrium



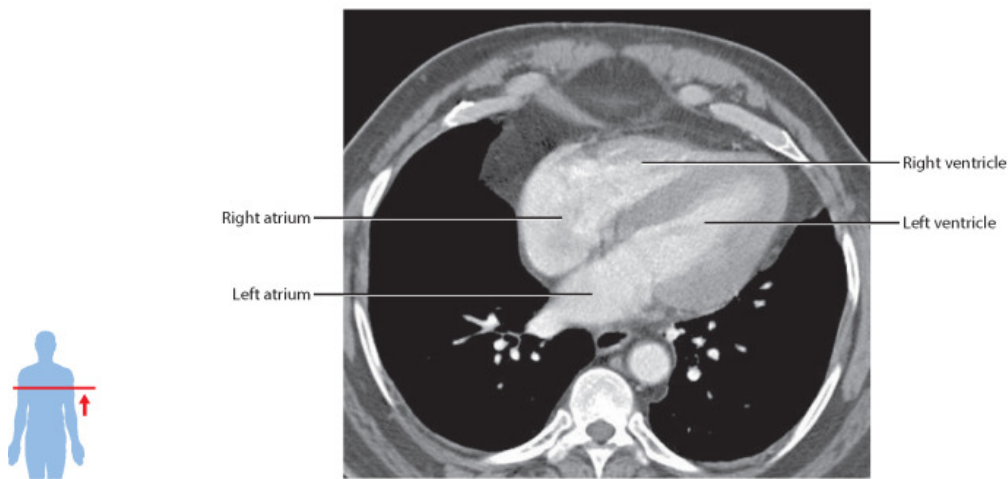
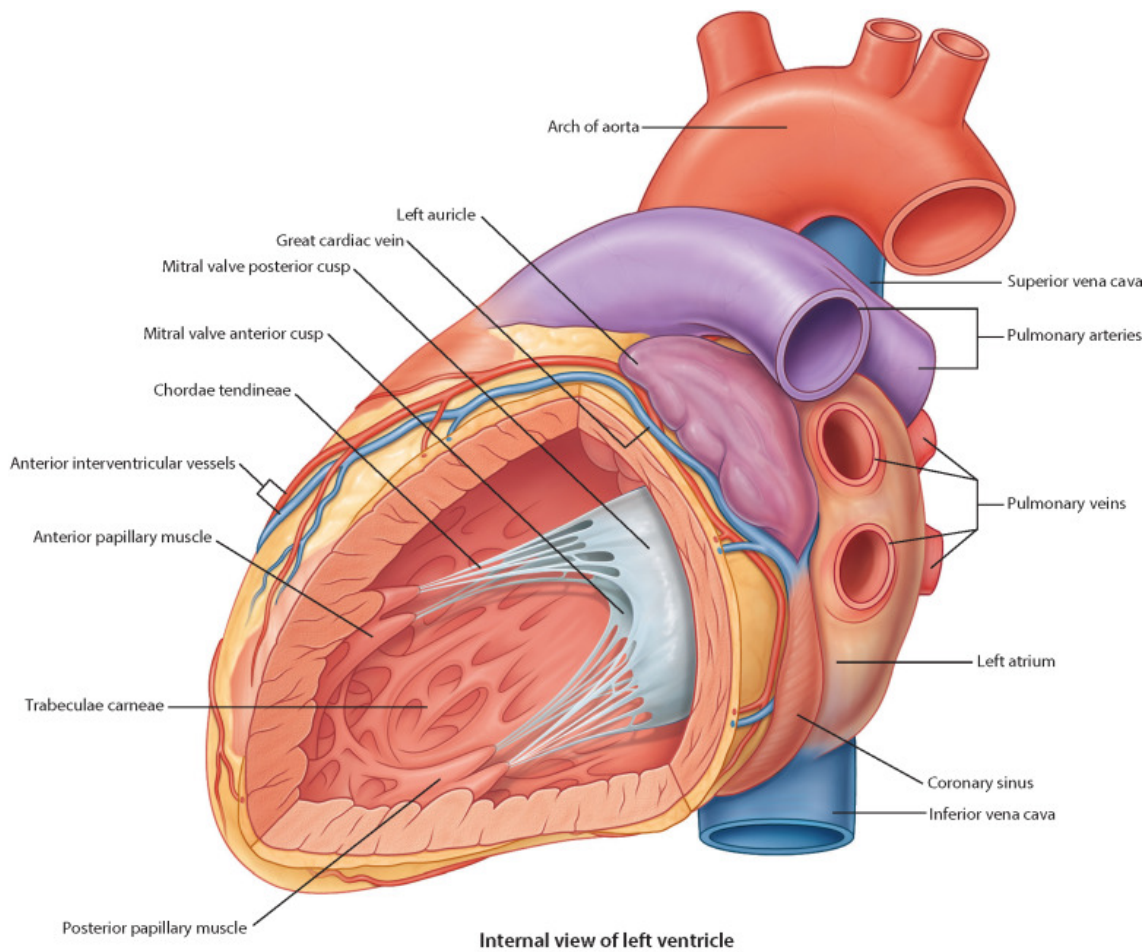
Internal view of left atrium



Positioning of left atrium in relation to other cardiac chambers.
CT image, with contrast, in axial plane

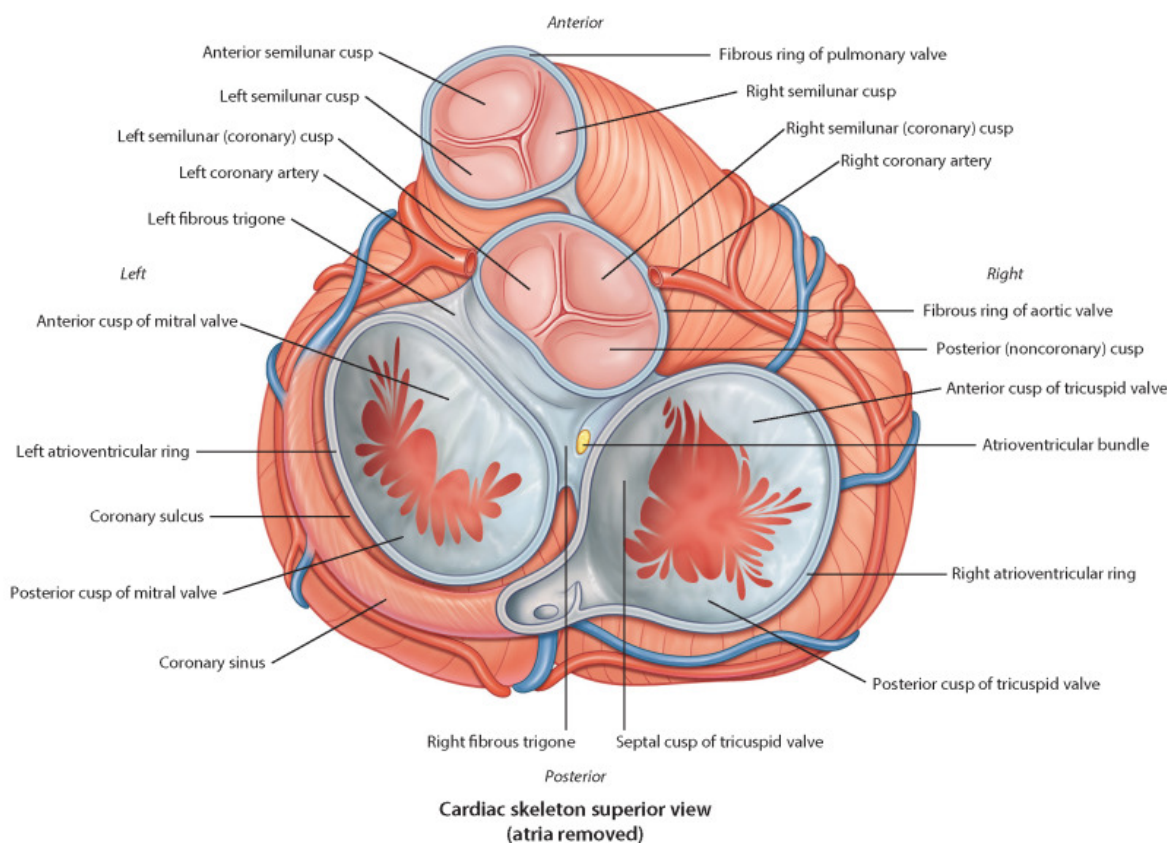
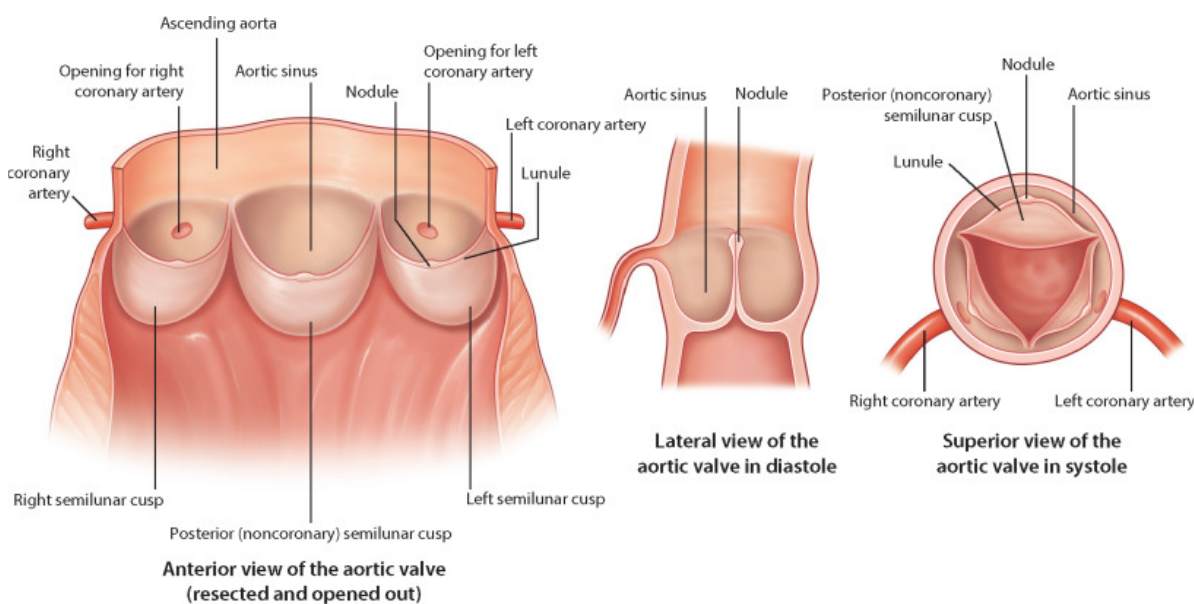


Left ventricle



Positioning of left ventricle in relation to other cardiac chambers.
CT image, with contrast, in axial plane

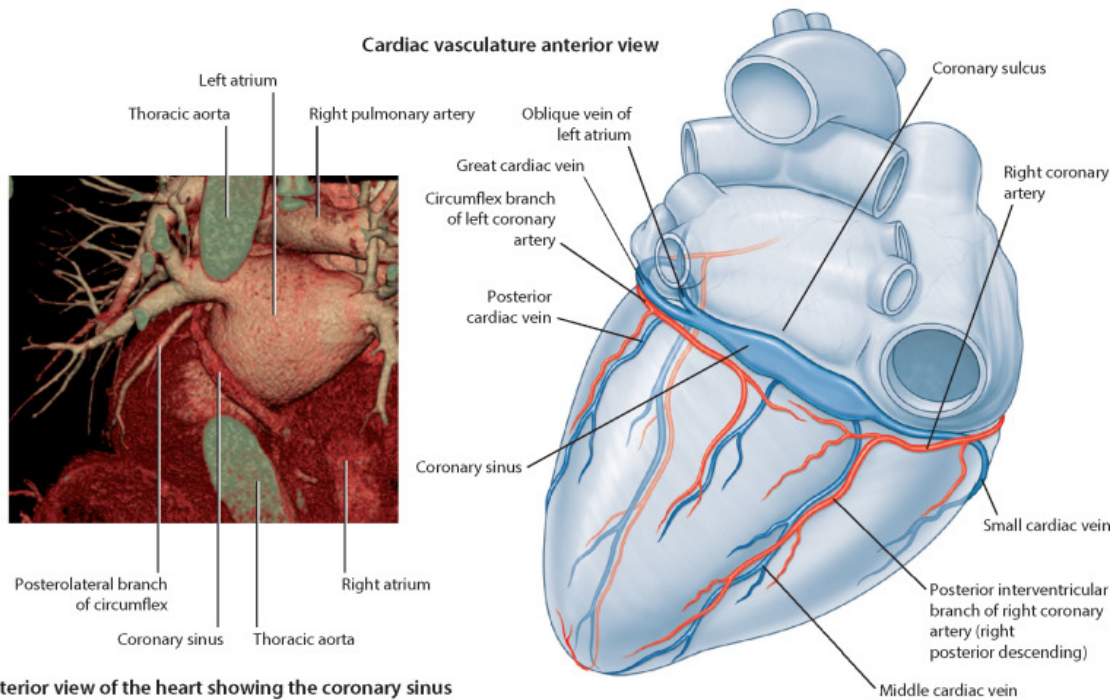
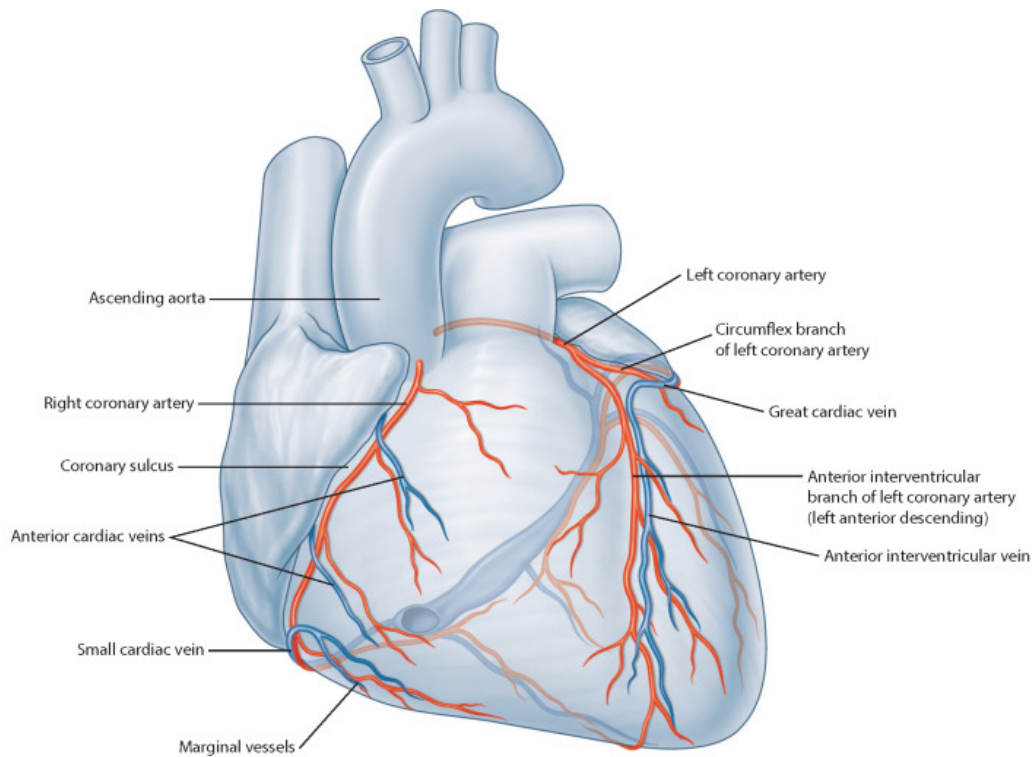
Aortic valve and cardiac skeleton



Cardiac chambers and heart valves



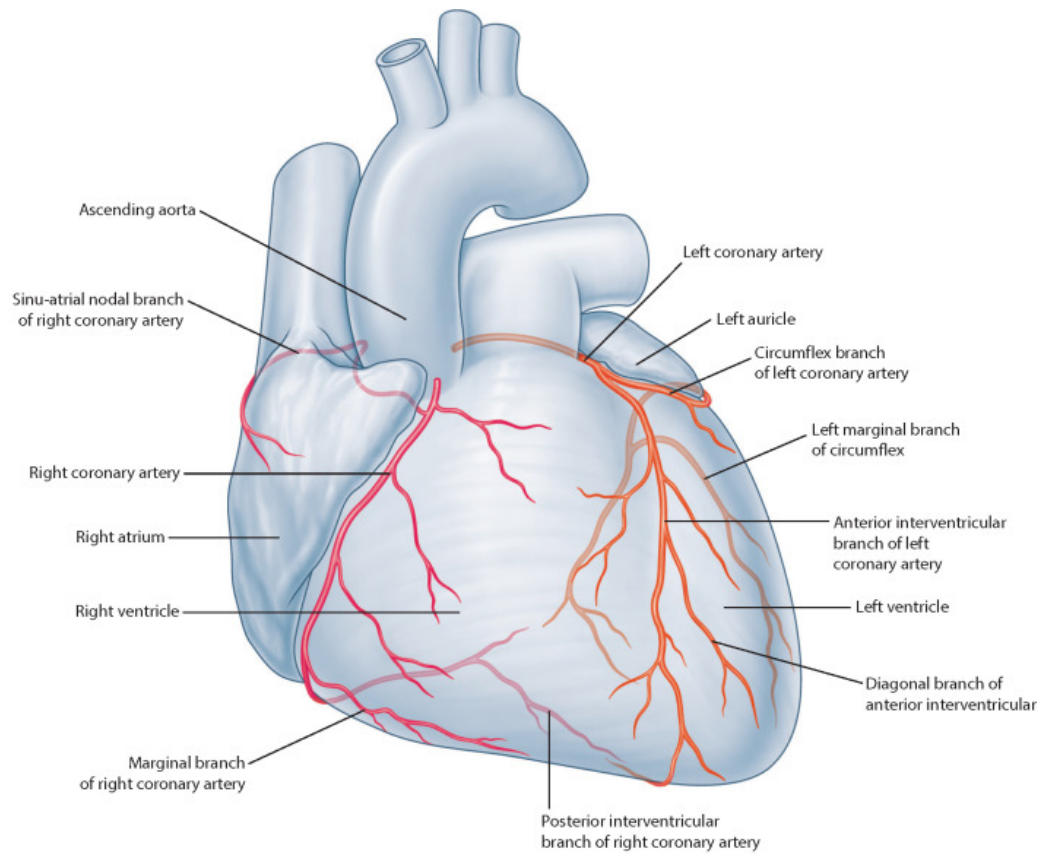
<https://www.clinicalkey.com/>



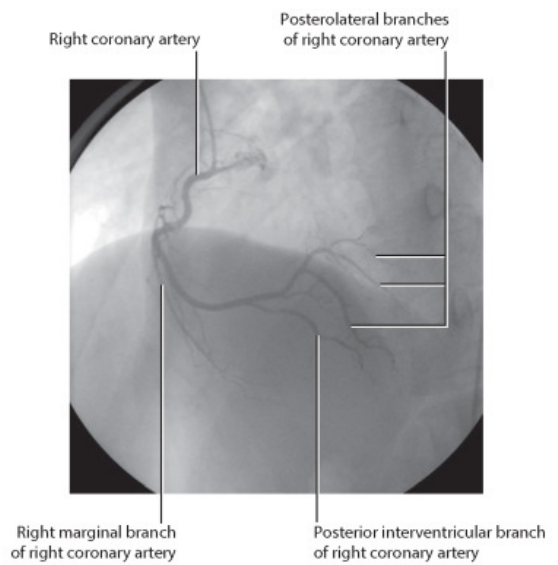
Posterior view of the heart showing the coronary sinus
Volume-rendered posterior view using multidetector computed tomography

Posteroinferior view

Coronary arteries and variations

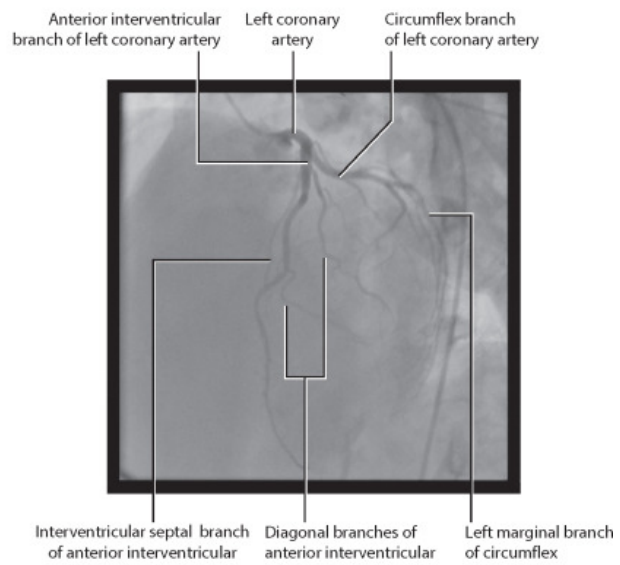


Coronary arteries (right dominant system)



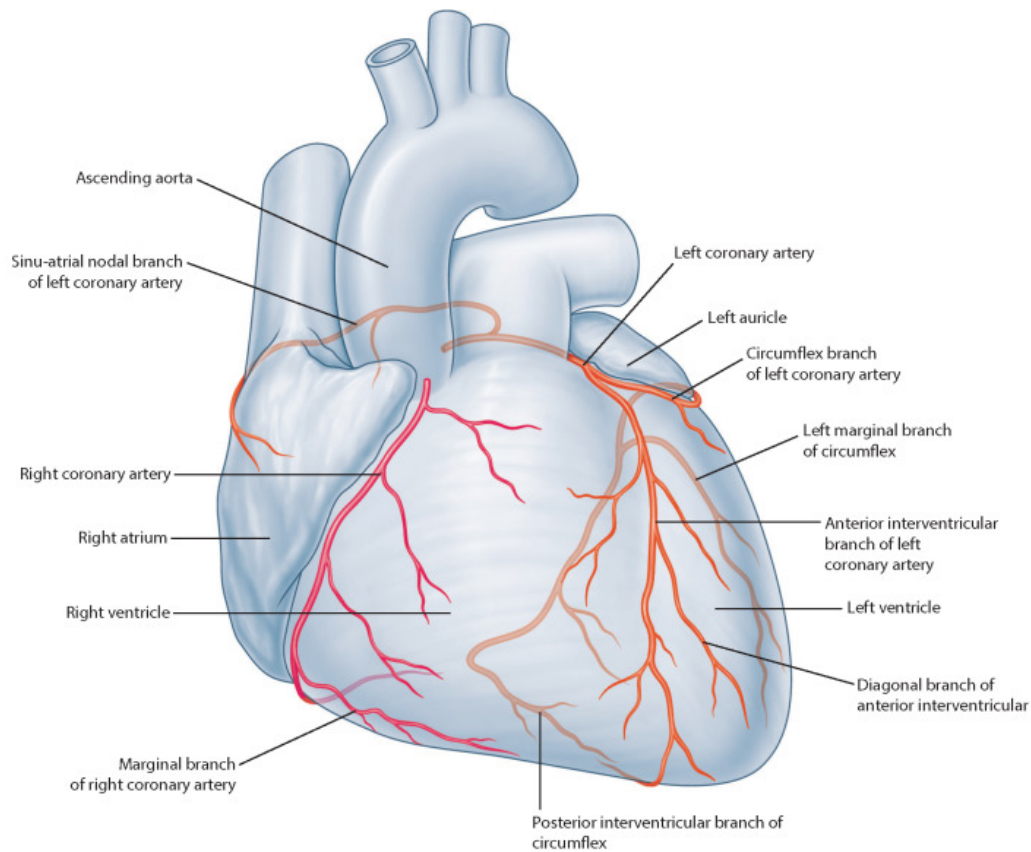
Coronary angiography (right dominant system).

Left anterior oblique projection, cranial angulation, of right coronary artery

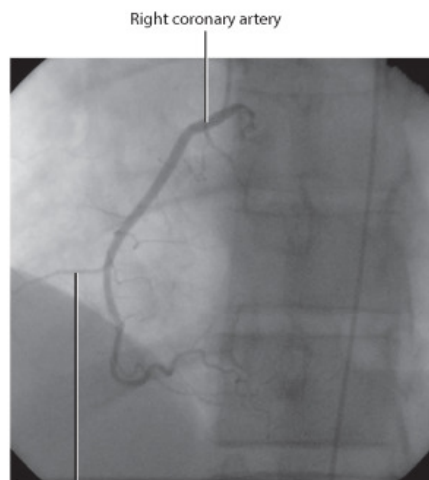


Coronary angiography (right dominant system).

Left anterior oblique projection, cranial angulation, of left coronary artery

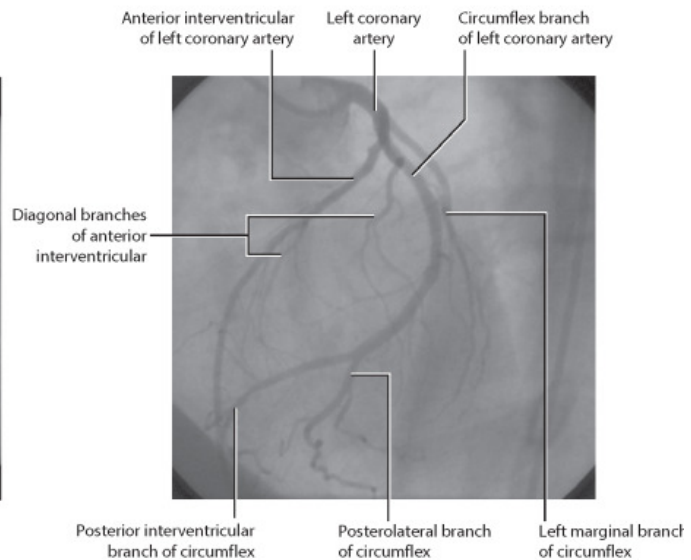


Coronary arteries (left dominant system)



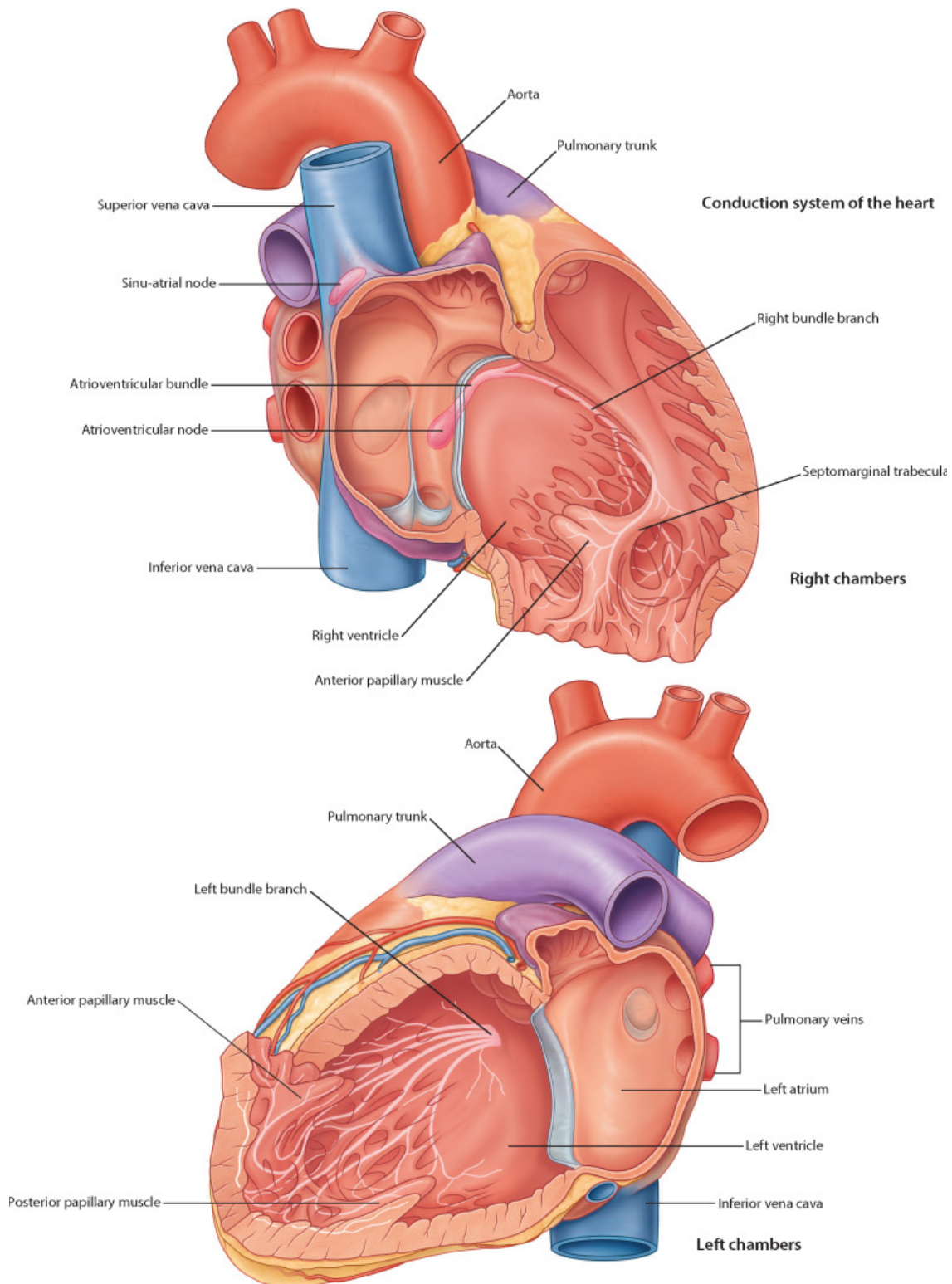
Right coronary artery
Right marginal branch of right coronary artery

Coronary angiography (left dominant system).
Left anterior oblique projection, cranial angulation, of right coronary artery

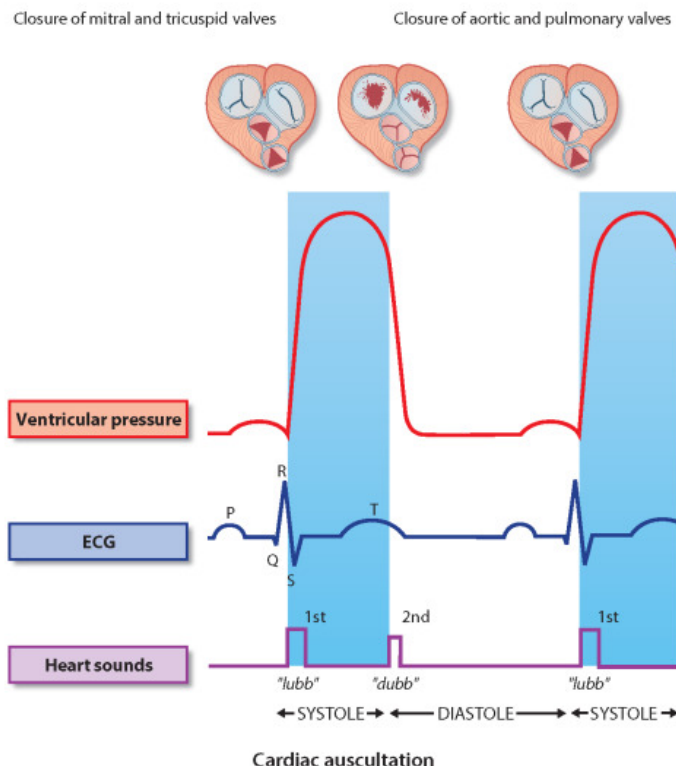
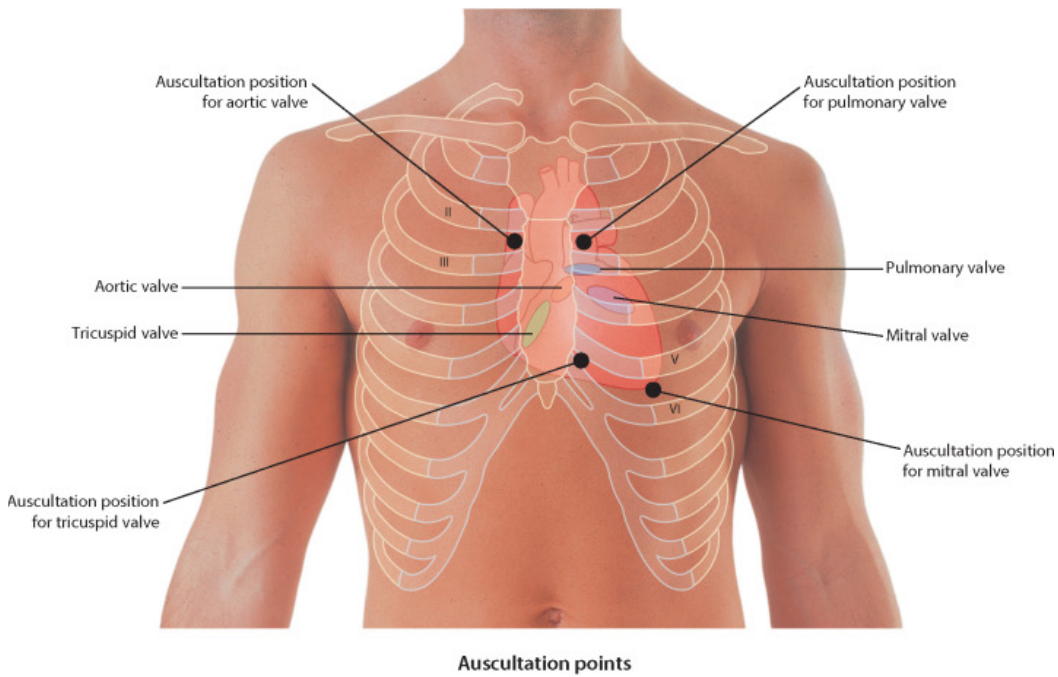


Coronary angiography (left dominant system).
Left anterior oblique projection, cranial angulation, of left coronary artery

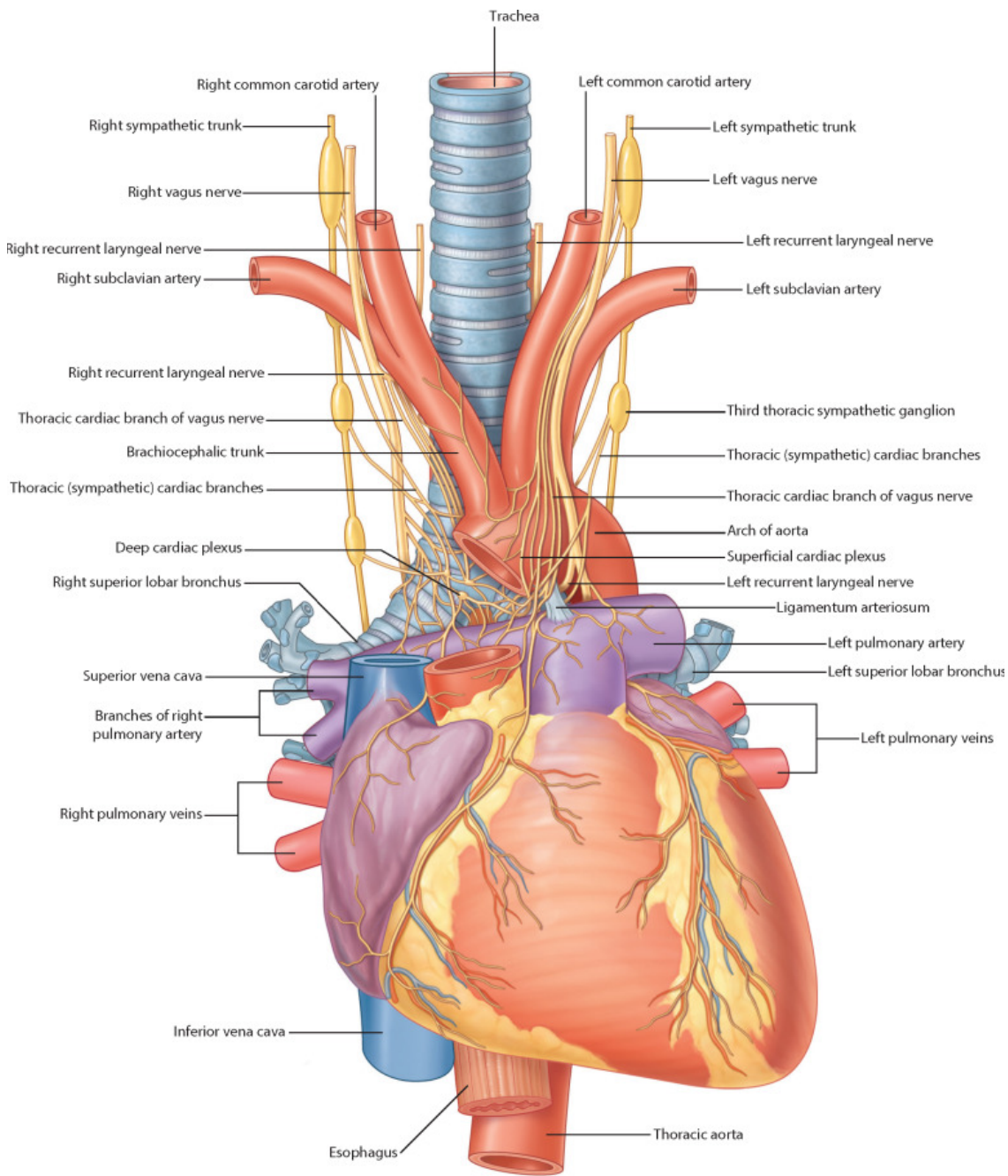
Cardiac conduction system



Auscultation points and heart sounds

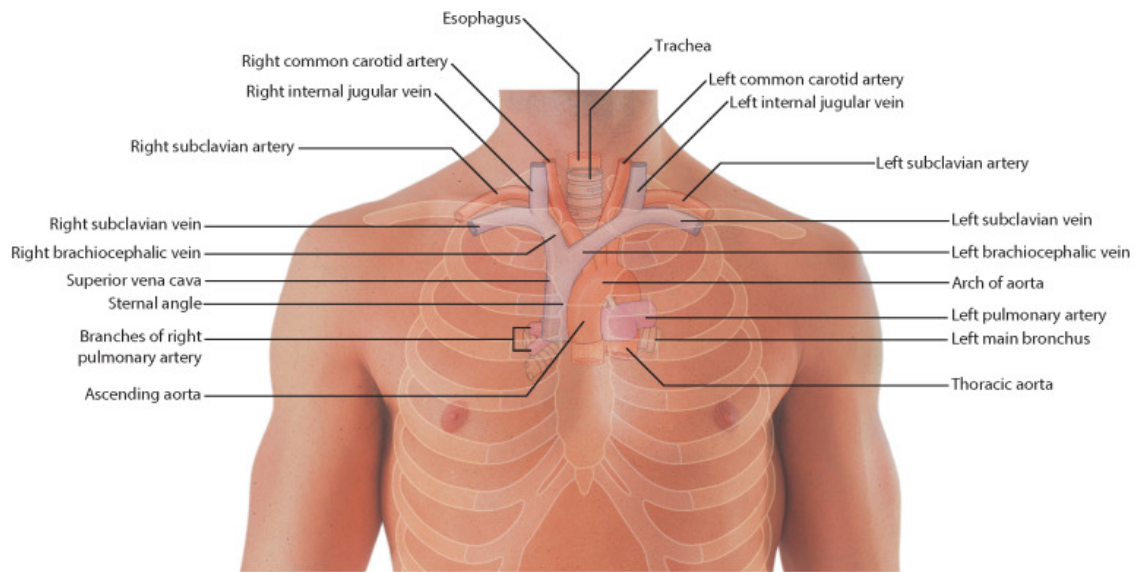


Cardiac innervation

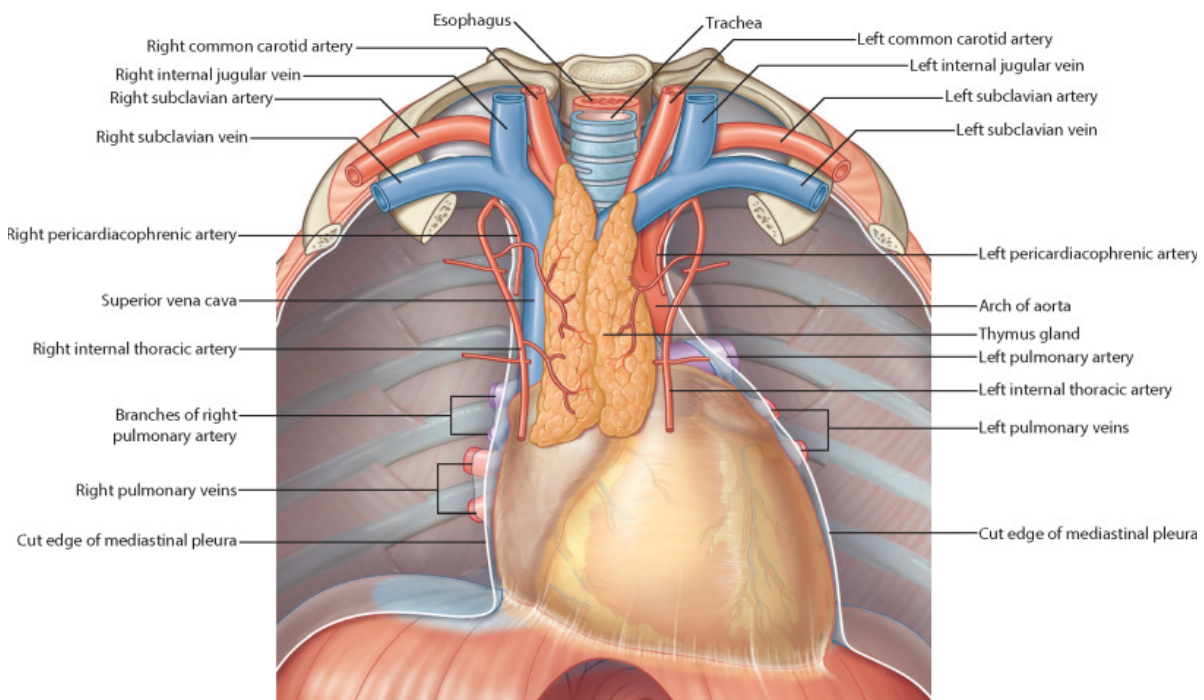


Cardiac plexus and nerves of the heart

Superior mediastinum: thymus

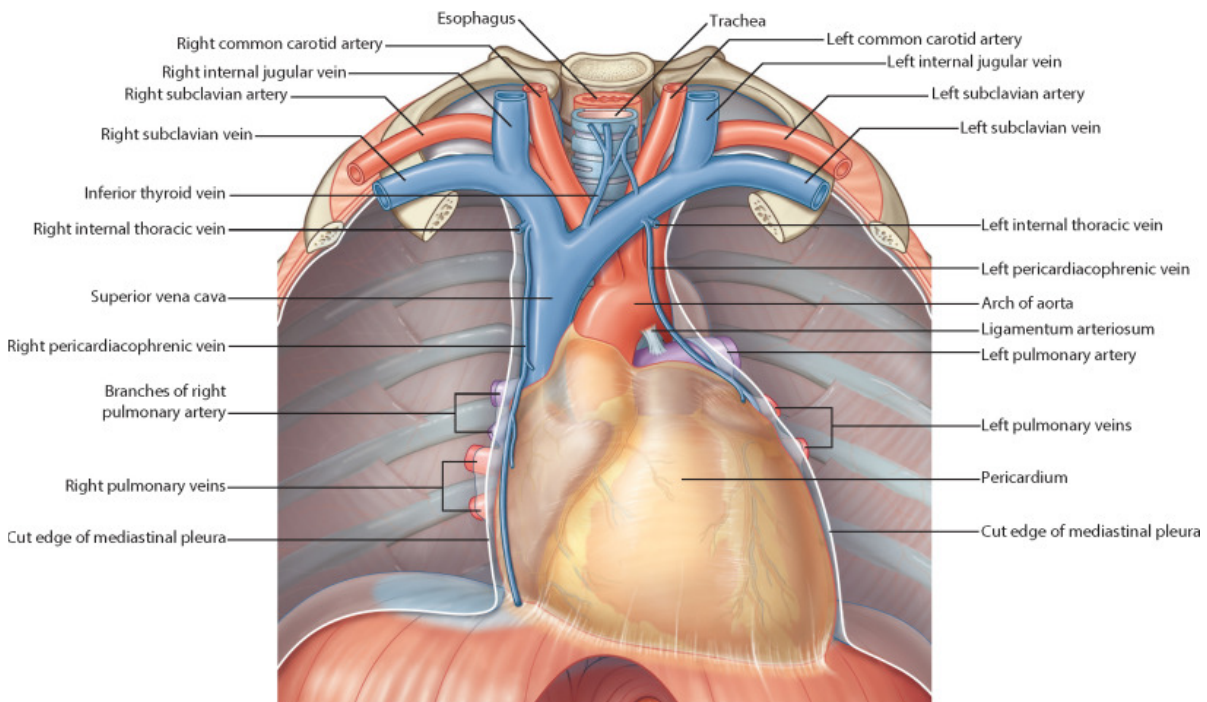


Surface projections of structures in the superior mediastinum

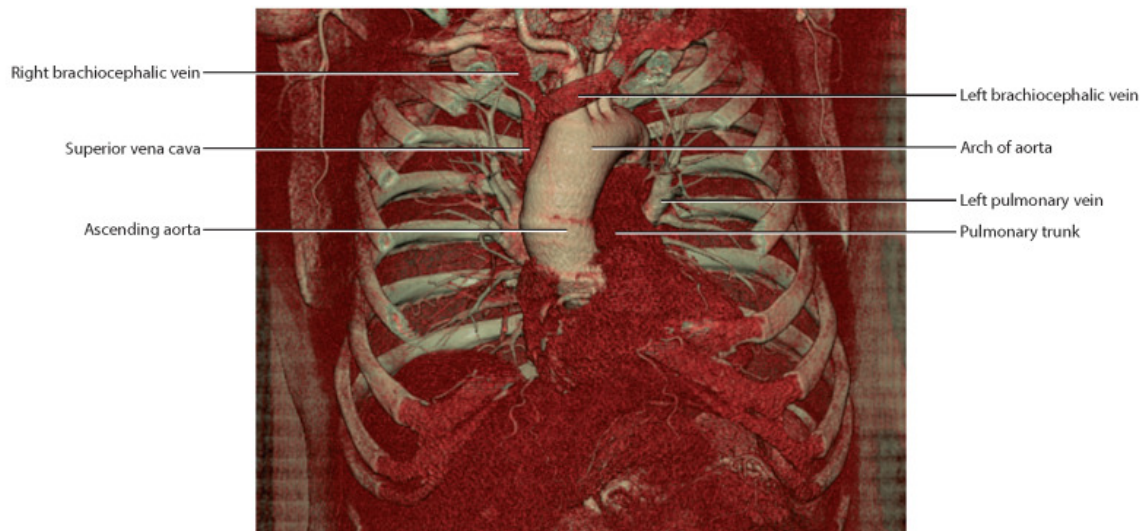


Thymus gland

Superior mediastinum: veins and arteries

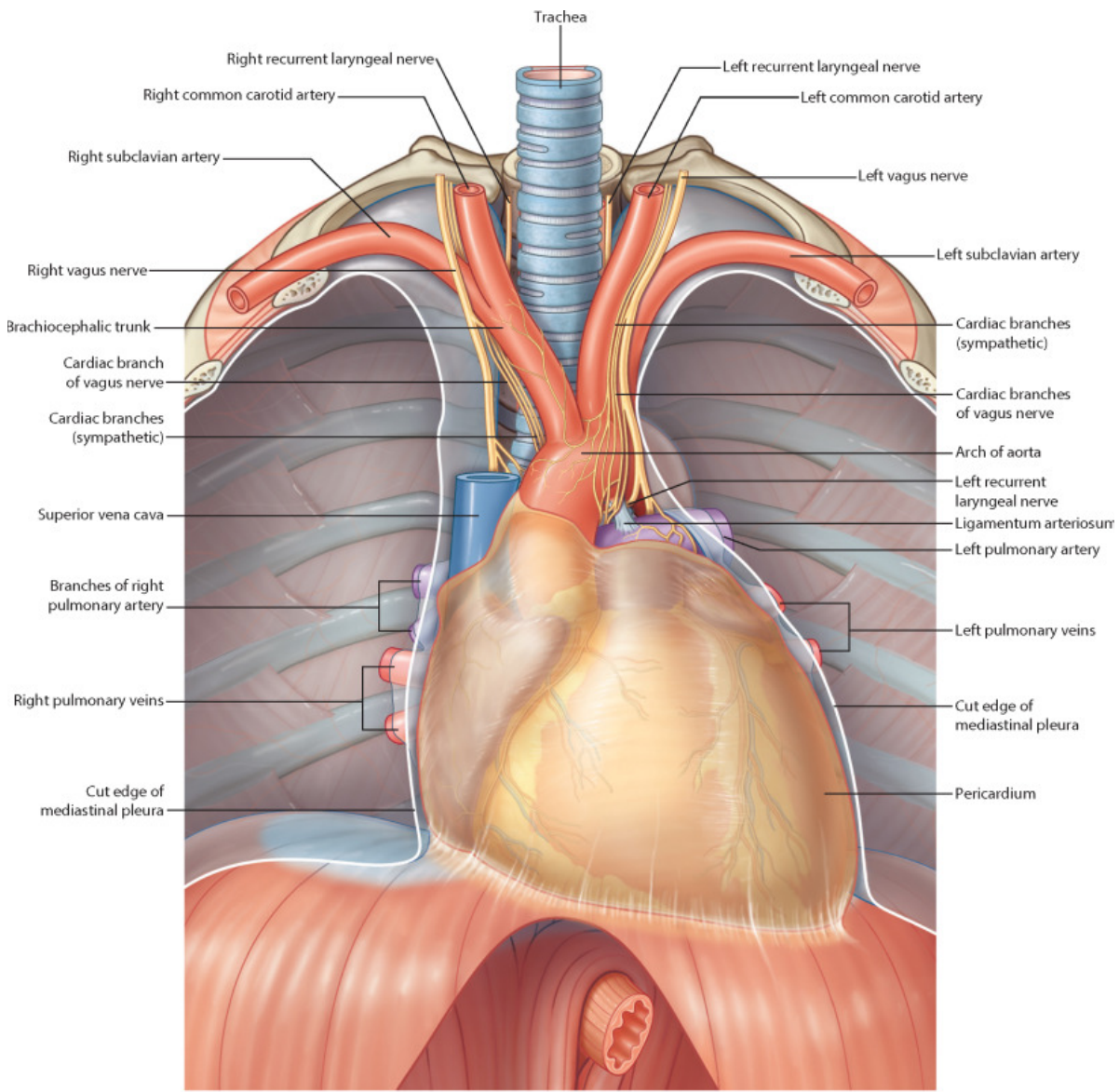


Veins of the superior mediastinum



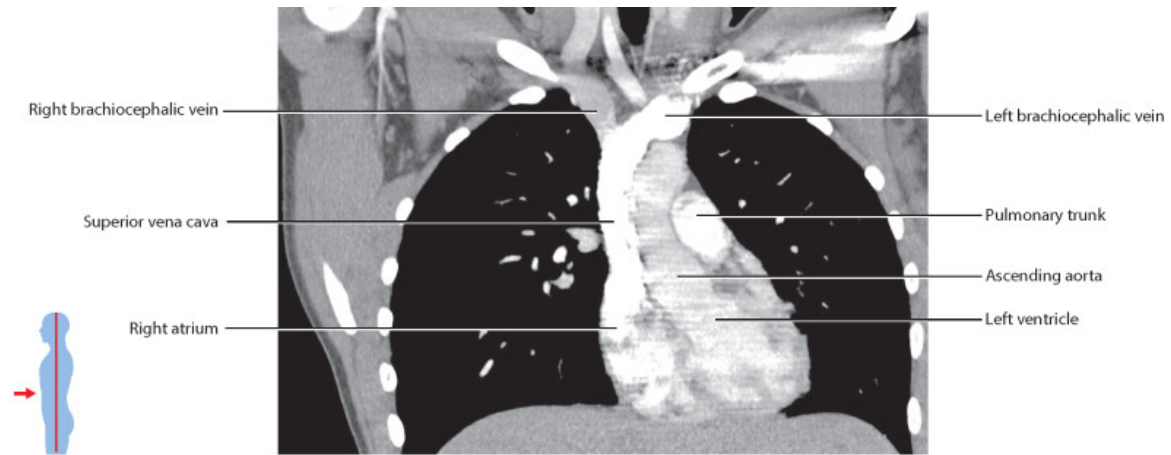
Anterior view of the superior mediastinum showing venous and arterial channels.
Volume-rendered anterior view using multidetector computed tomography

Superior mediastinum: arteries and nerves

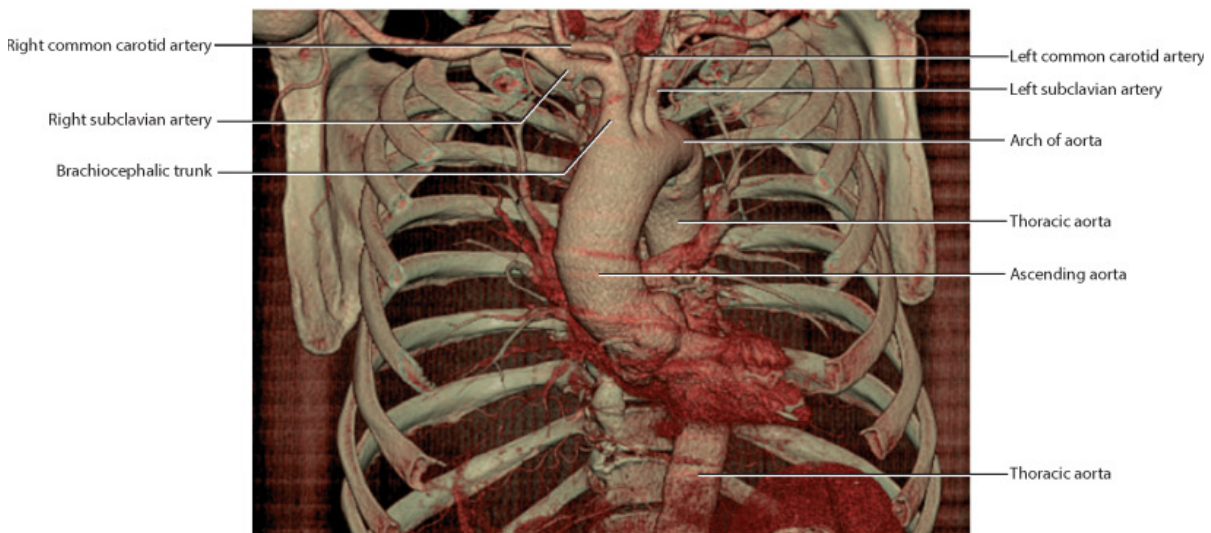


Arteries and nerves of the superior mediastinum

Superior mediastinum: imaging

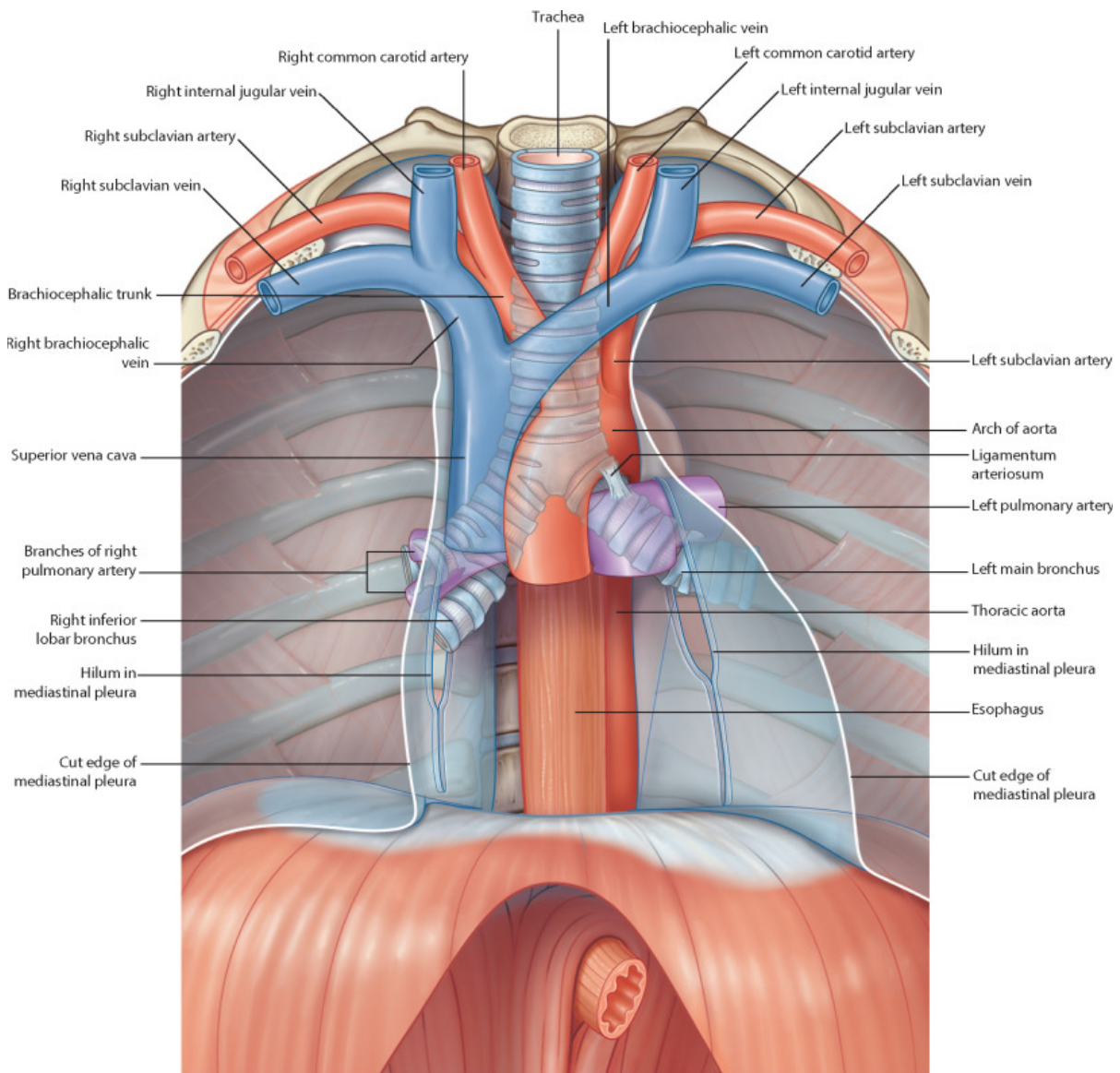


Positioning of venous channels in the superior mediastinum.
CT image, with contrast, in coronal plane



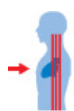
Anterior view of the superior mediastinum with the venous channels, pulmonary trunk, and heart removed.
Volume-rendered anterior view using multidetector computed tomography

Superior mediastinum: veins and trachea



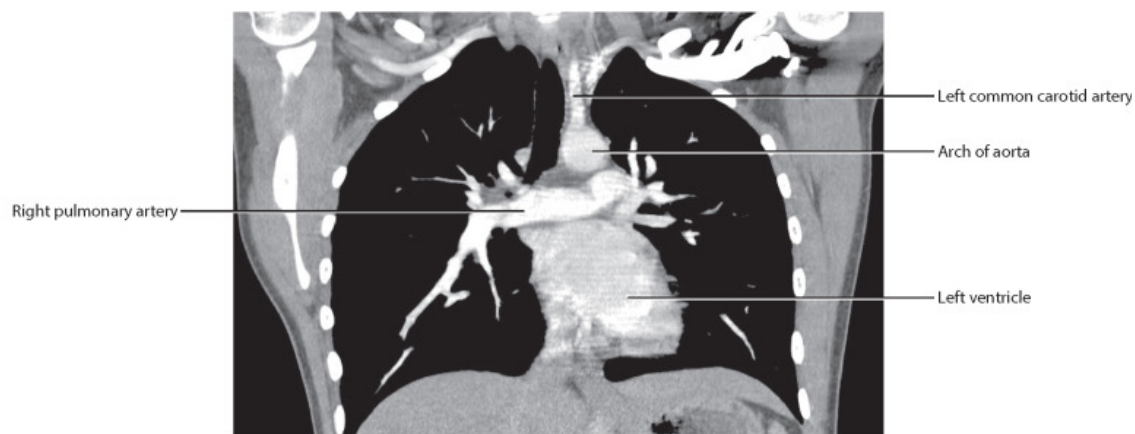
Trachea and structures relating to it in the superior mediastinum

Mediastinum: imaging



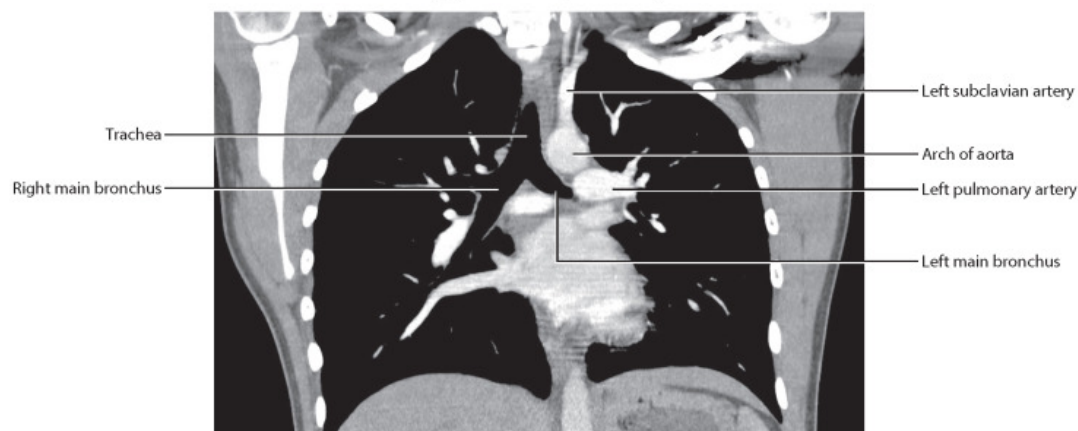
Positioning of brachiocephalic trunk in relation to other structures in the superior mediastinum.

CT image, with contrast, in coronal plane



Positioning of left common carotid artery in relation to other structures in the superior mediastinum.

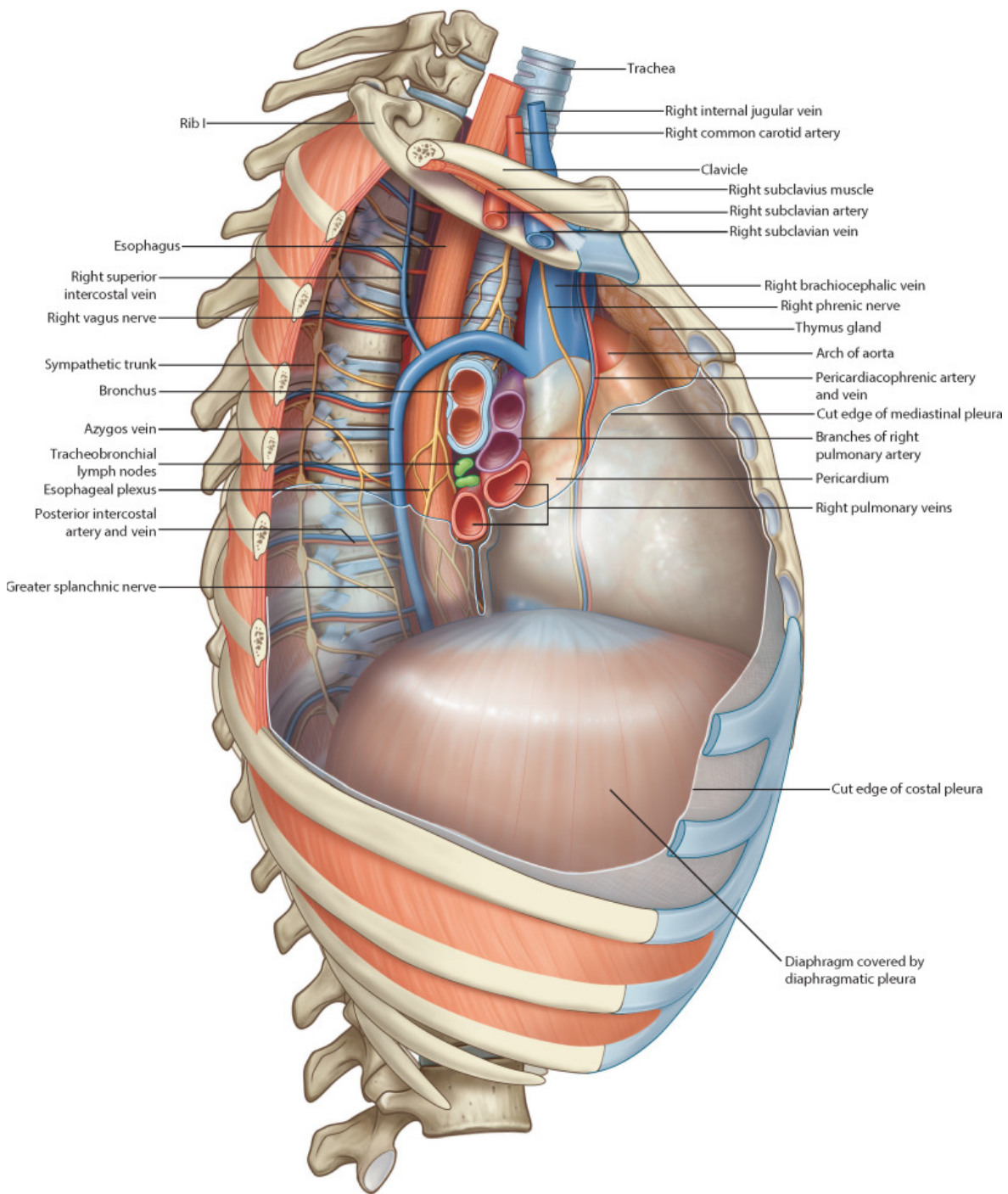
CT image, with contrast, in coronal plane



Positioning of left subclavian artery and the bifurcation of the trachea in relation to other structures in the superior mediastinum.

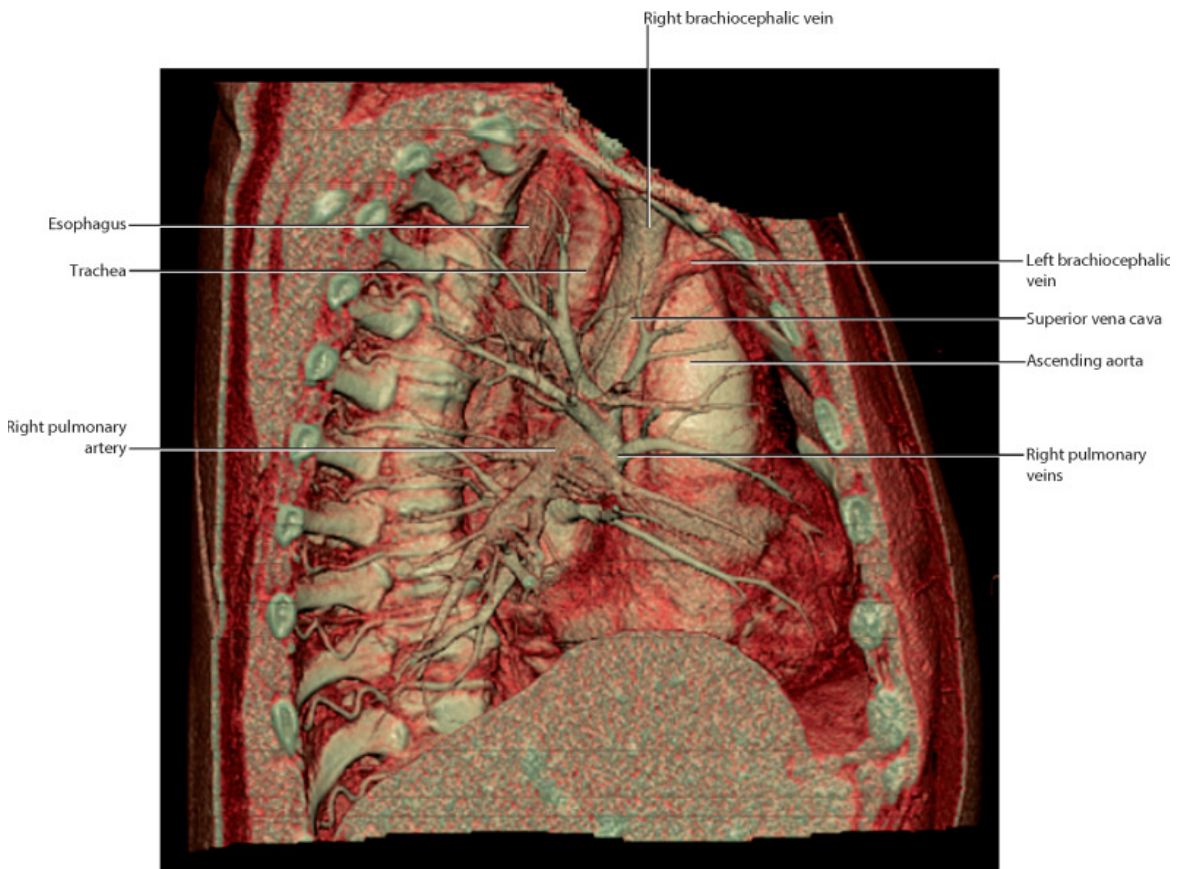
CT image, with contrast, in coronal plane

Mediastinum: view from right



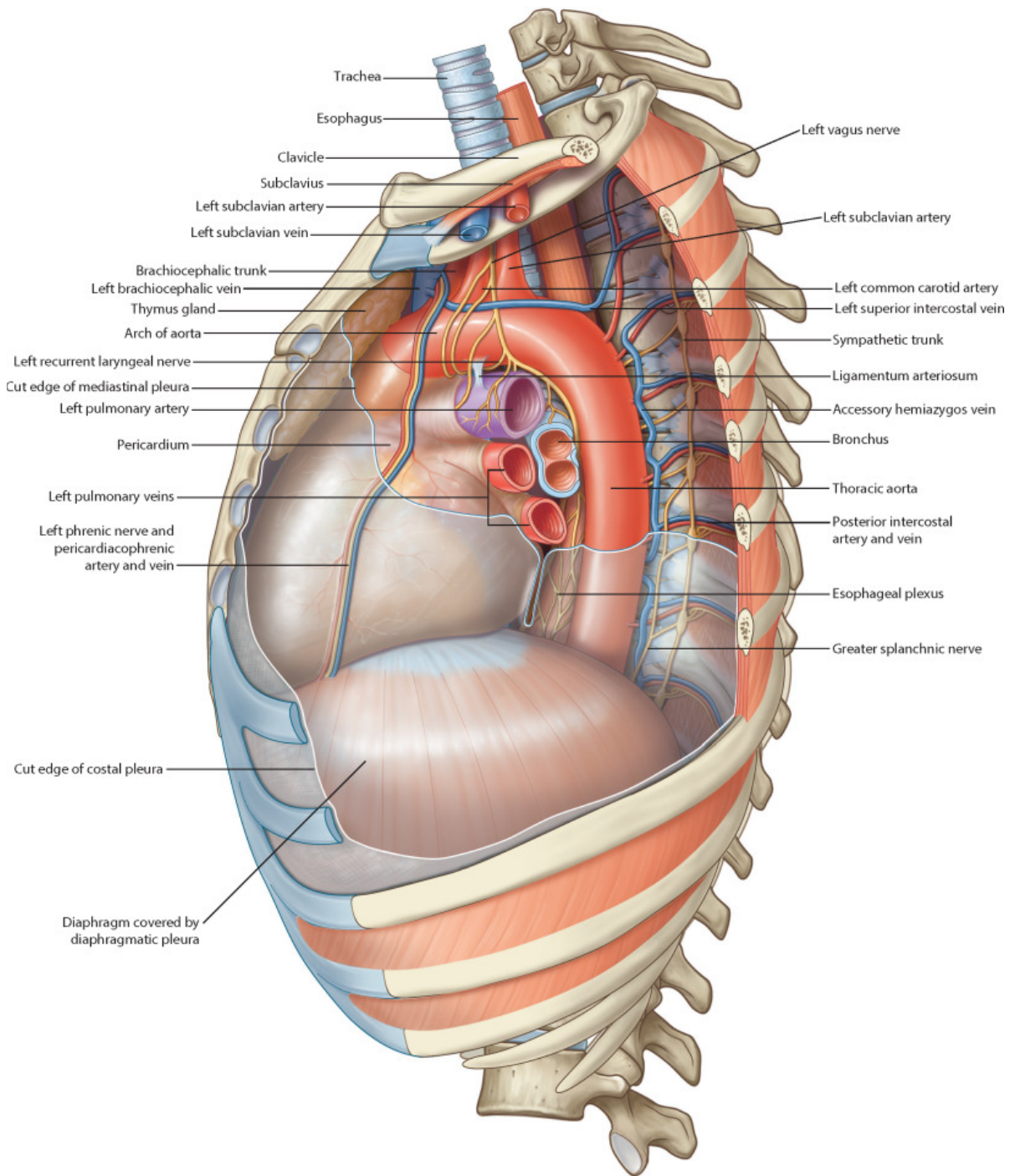
Right side of mediastinum and right thoracic cavity

Mediastinum: imaging – view from right



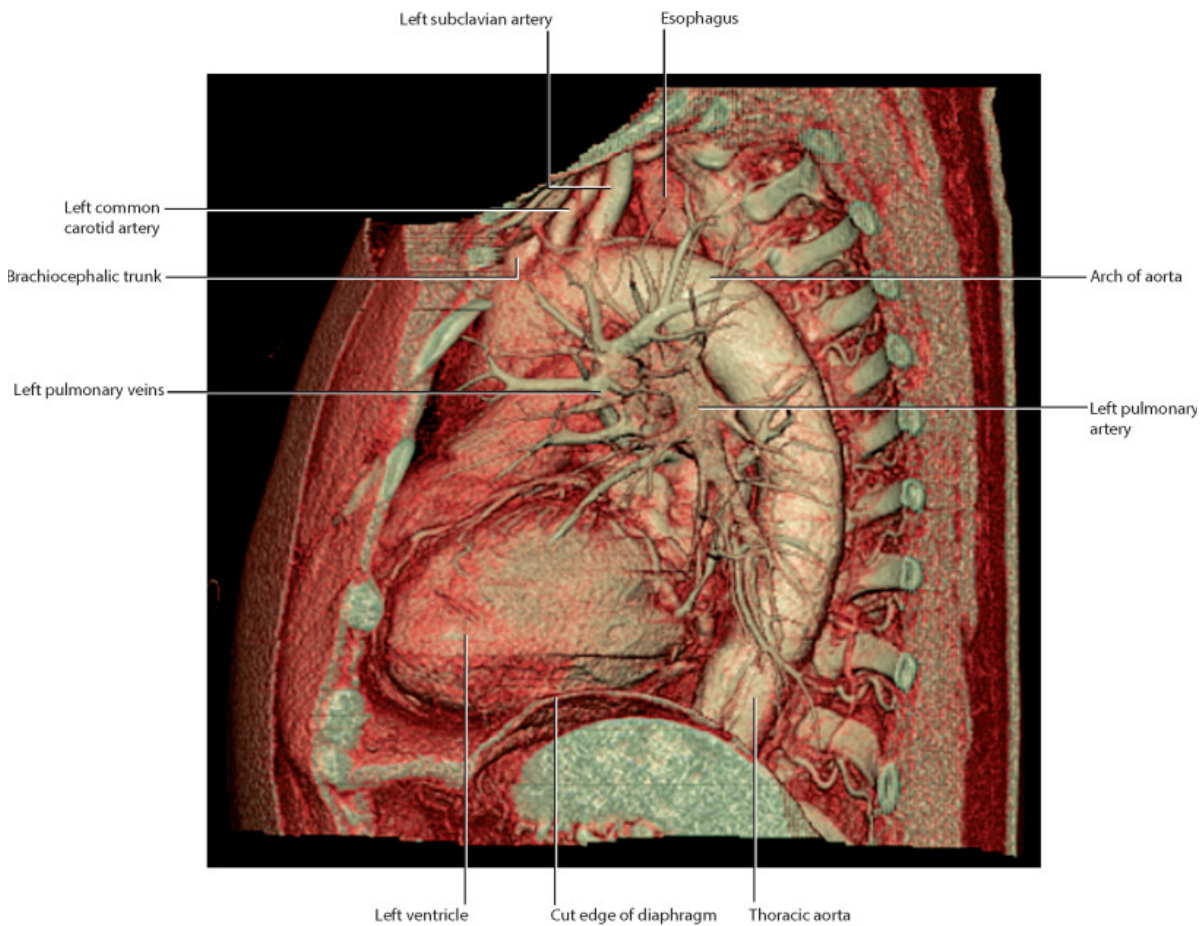
View of mediastinal structures from the right side of the thorax.
Volume-rendered lateral view from the right side using multidetector computed tomography

Mediastinum: view from left



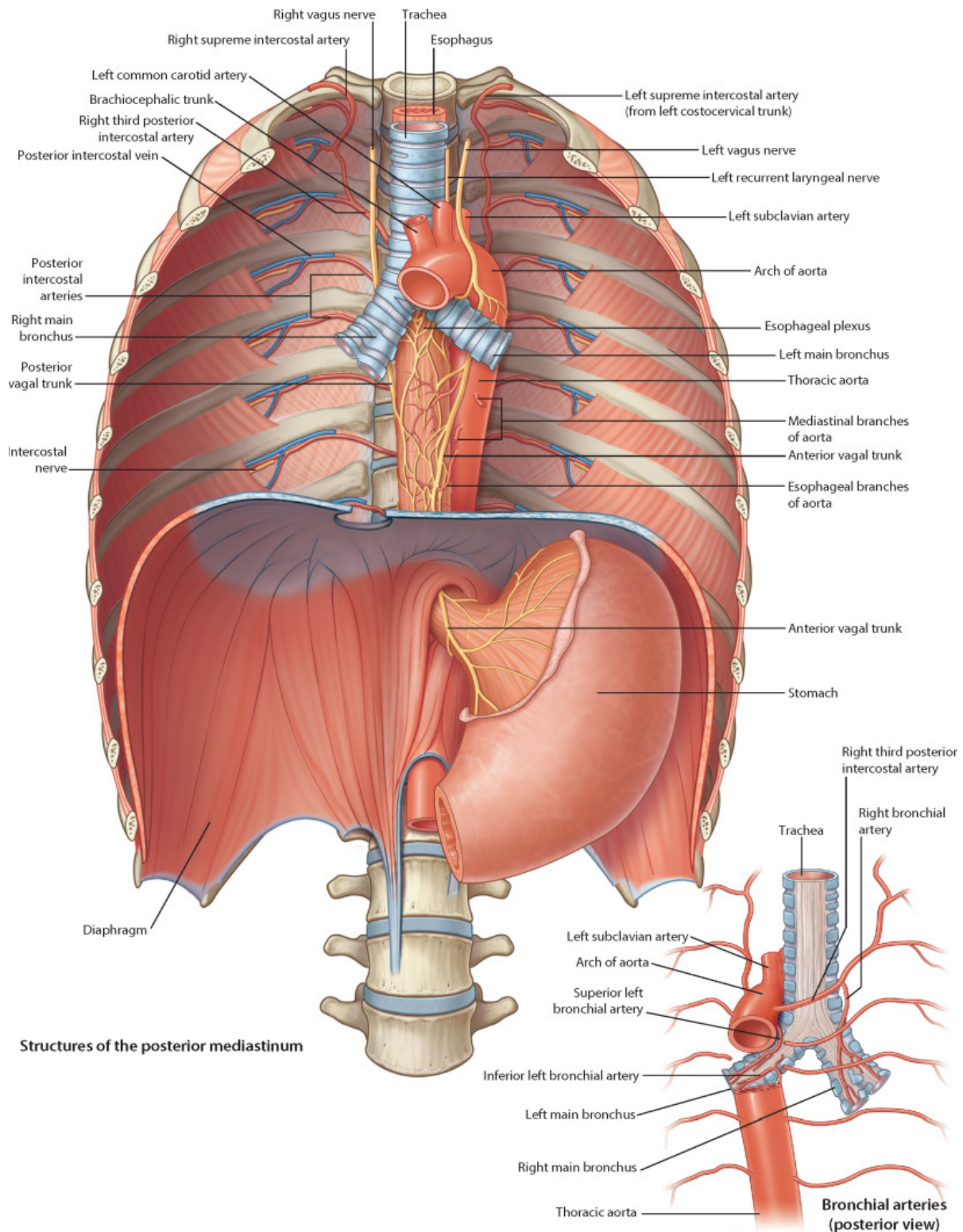
Left side of mediastinum and left thoracic cavity

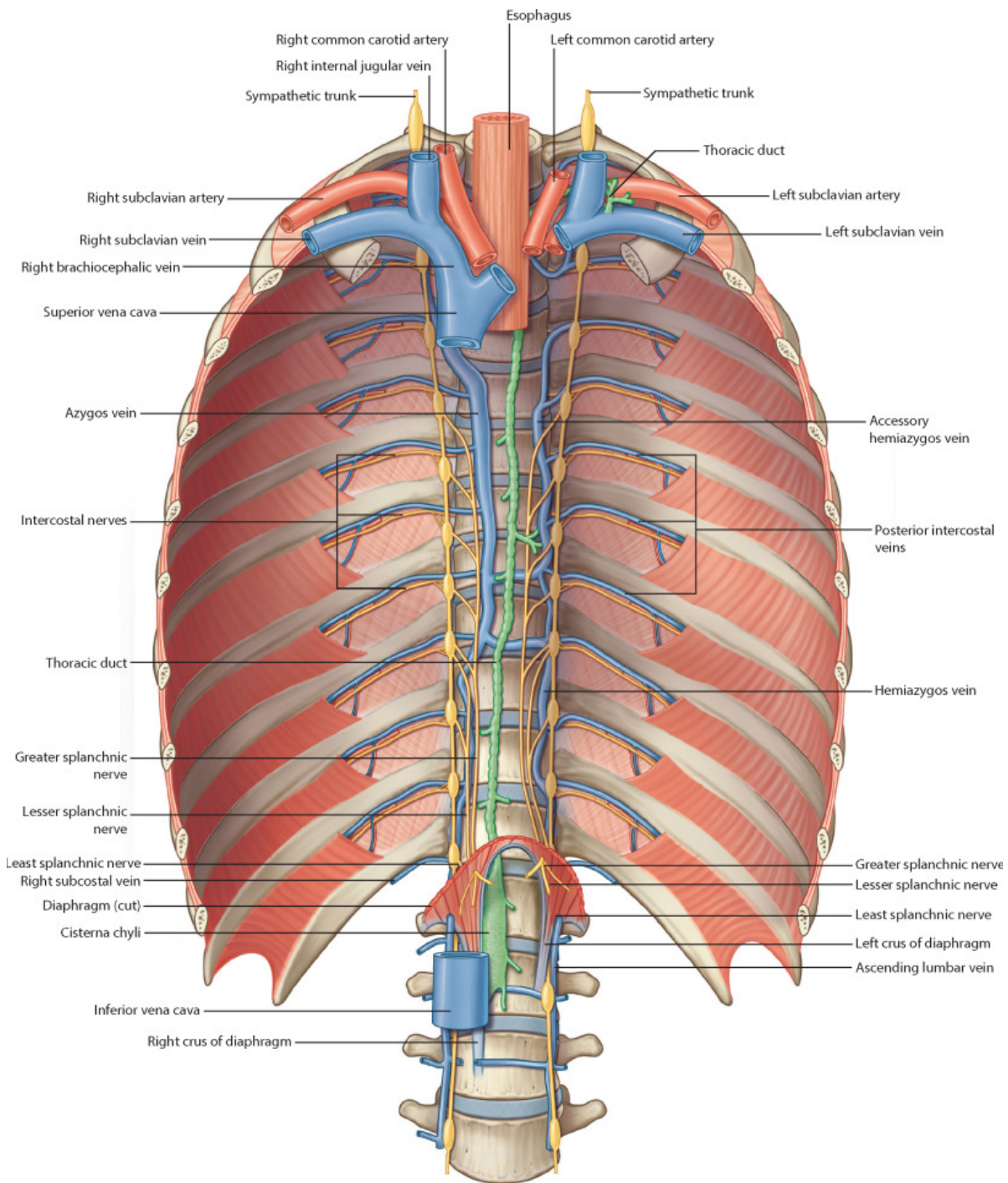
Mediastinum: imaging – view from left



View of mediastinal structures from the left side of the thorax.
Volume-rendered lateral view from the left side using multidetector computed tomography

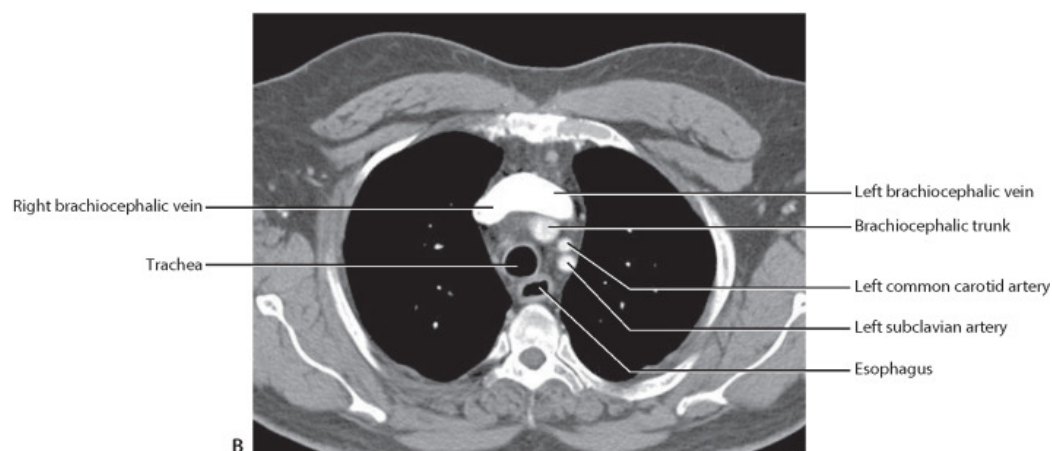
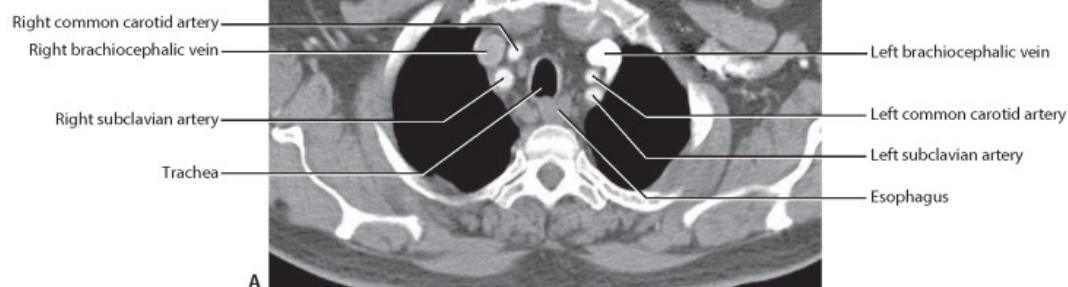
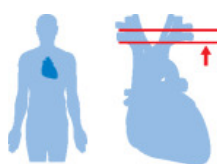
Posterior mediastinum



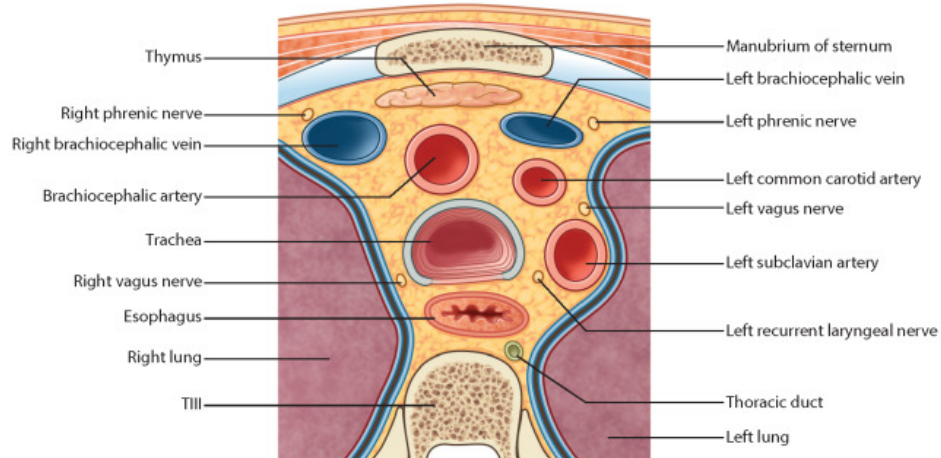


Structures of the posterior mediastinum
(thoracic aorta and esophagus removed)

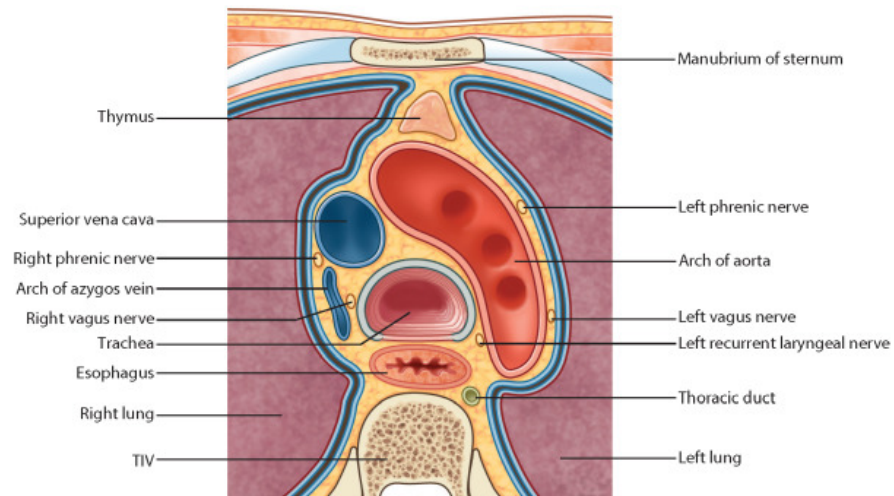
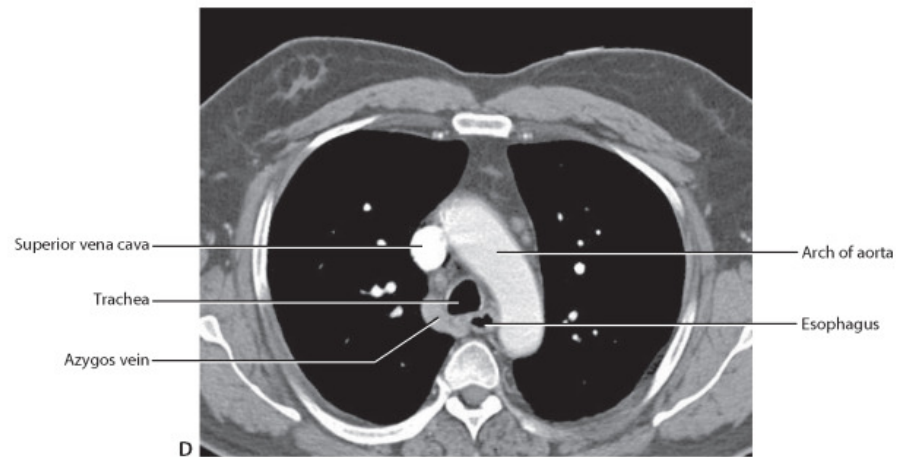
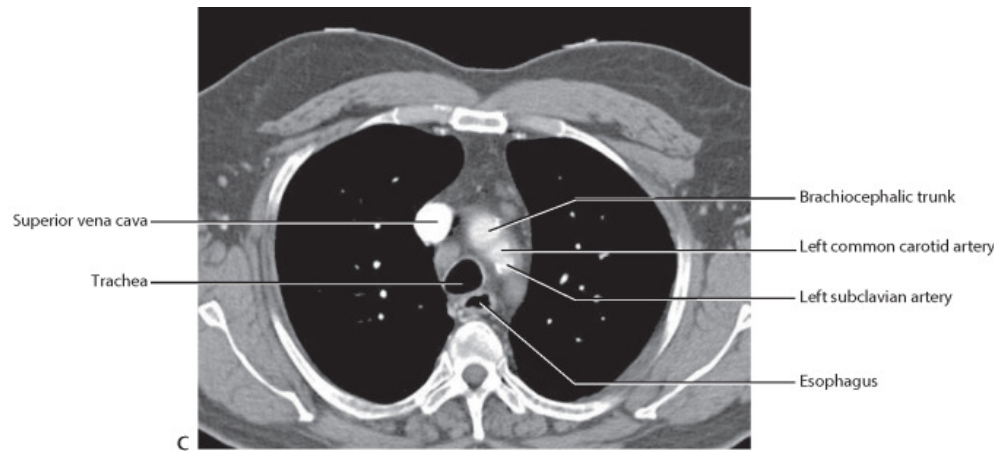
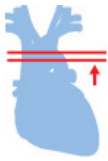
Mediastinum: imaging



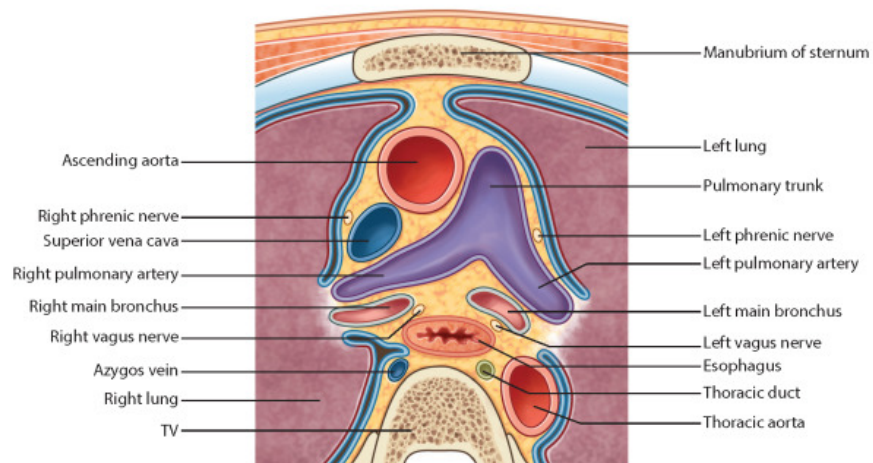
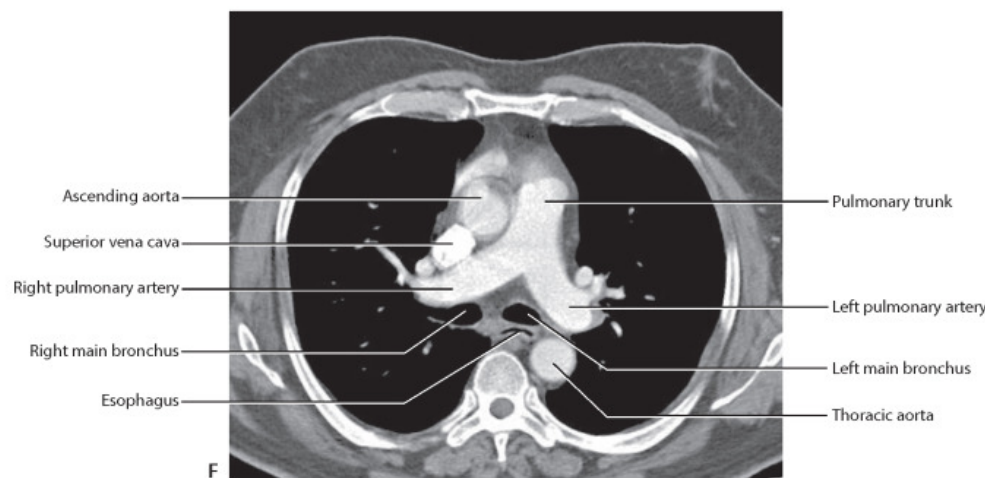
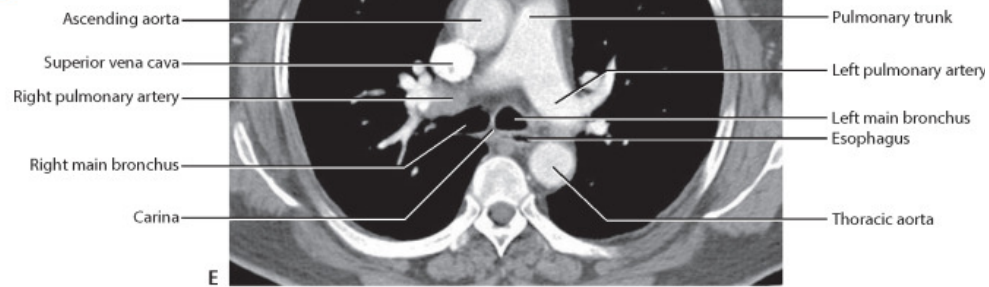
A through I – This is a series of images that pass through the thorax from superior to inferior showing the various mediastinal structures and their relationships with each other.
CT images, with contrast, in axial plane



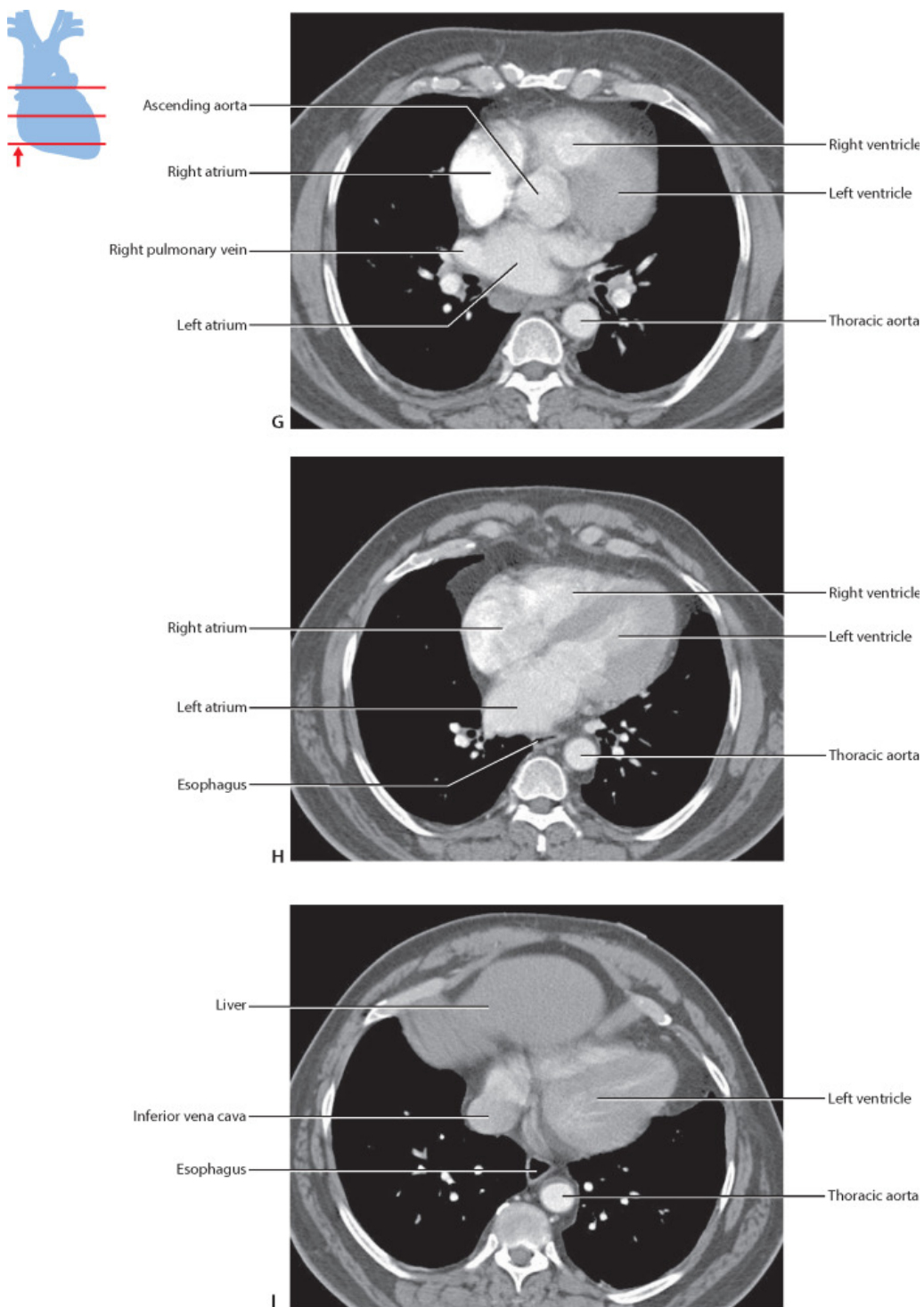
Transverse section through the superior mediastinum at the level of vertebra TIII



Transverse section through the superior mediastinum at the level of vertebra T4

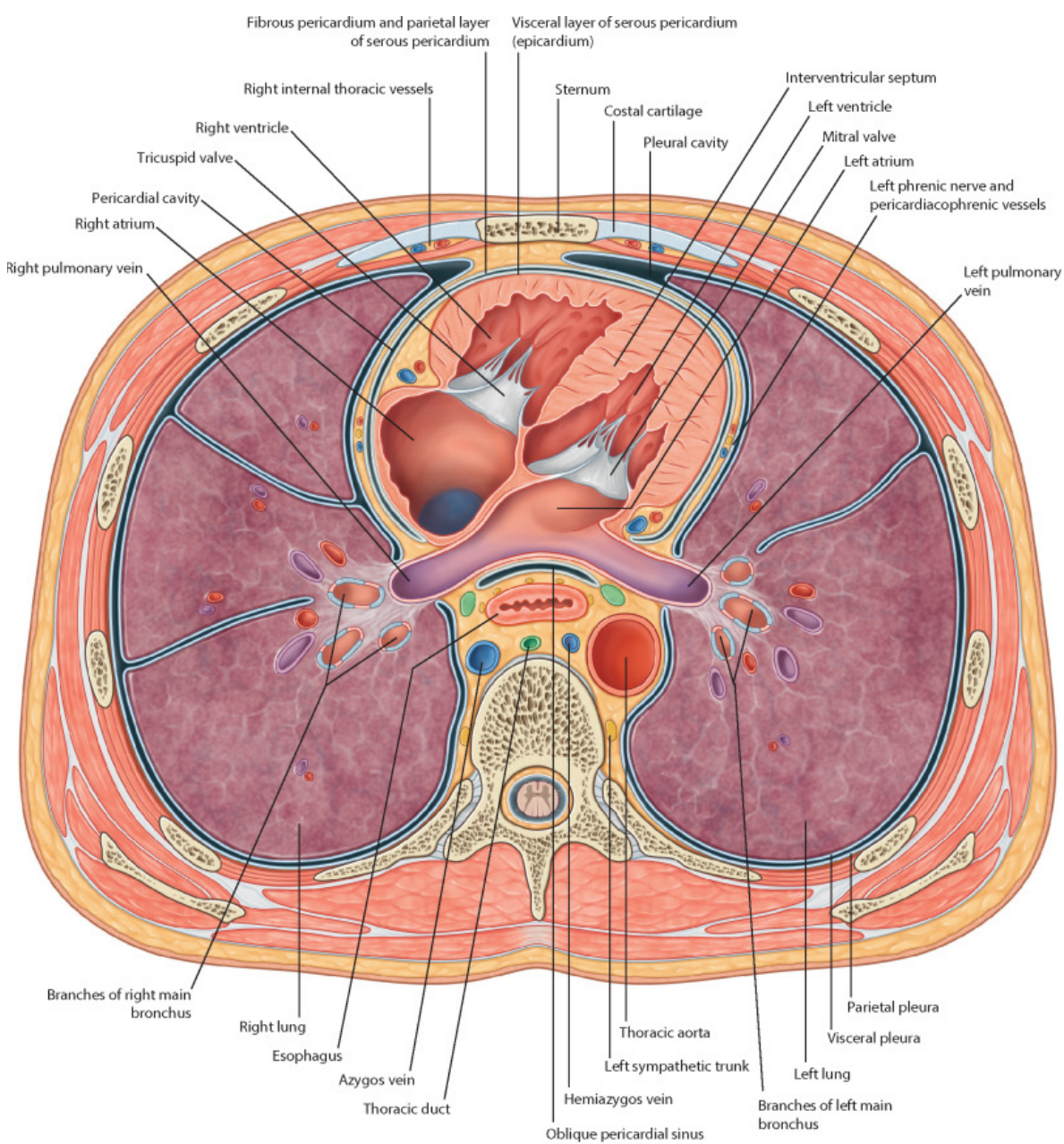


Transverse section through the superior mediastinum at the level of vertebra TV



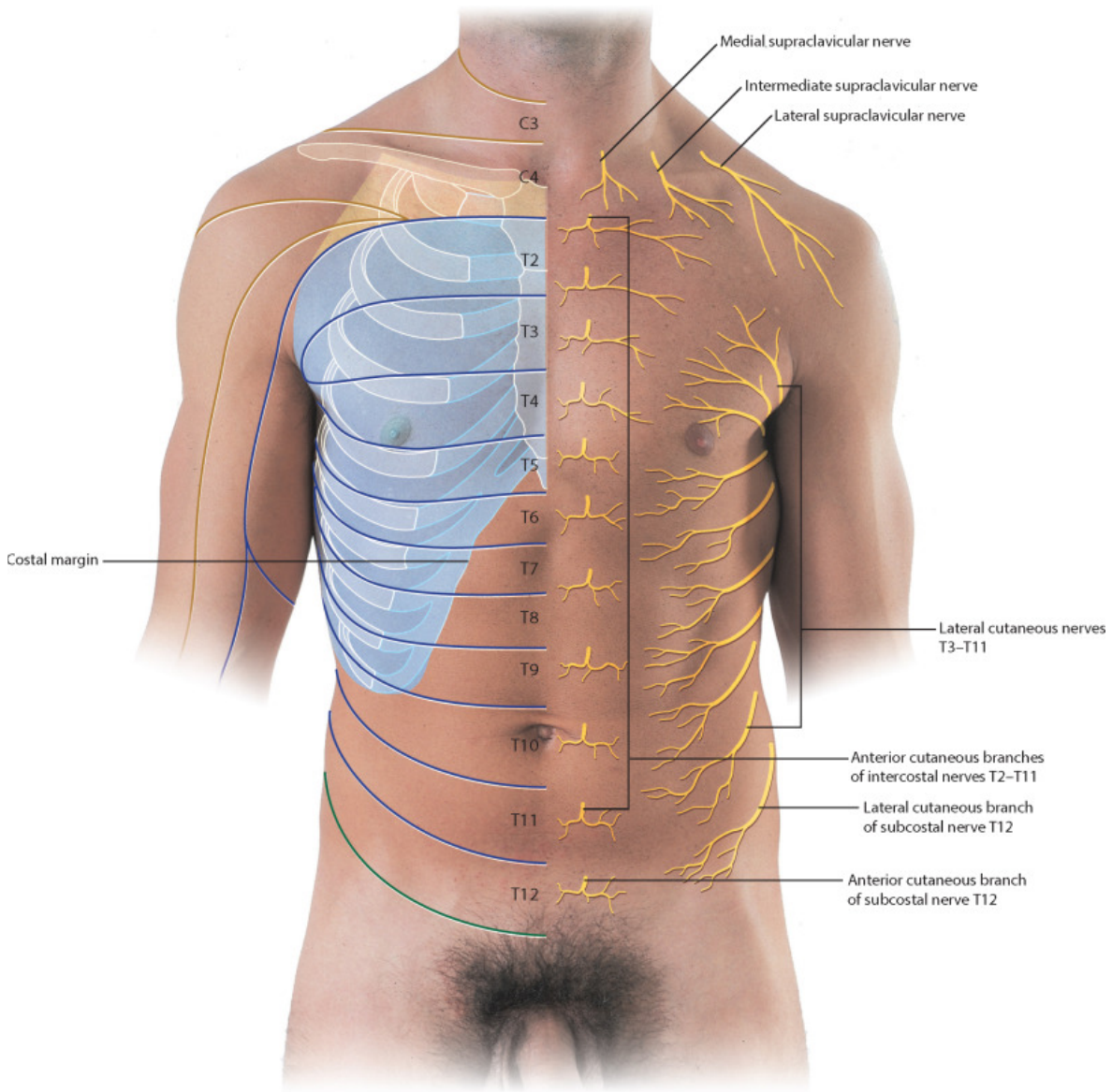
A through I – This is a series of images that pass through the thorax from superior to inferior showing the various mediastinal structures and their relationships with each other.
CT images, with contrast, in axial plane

Transverse section: TVIII level



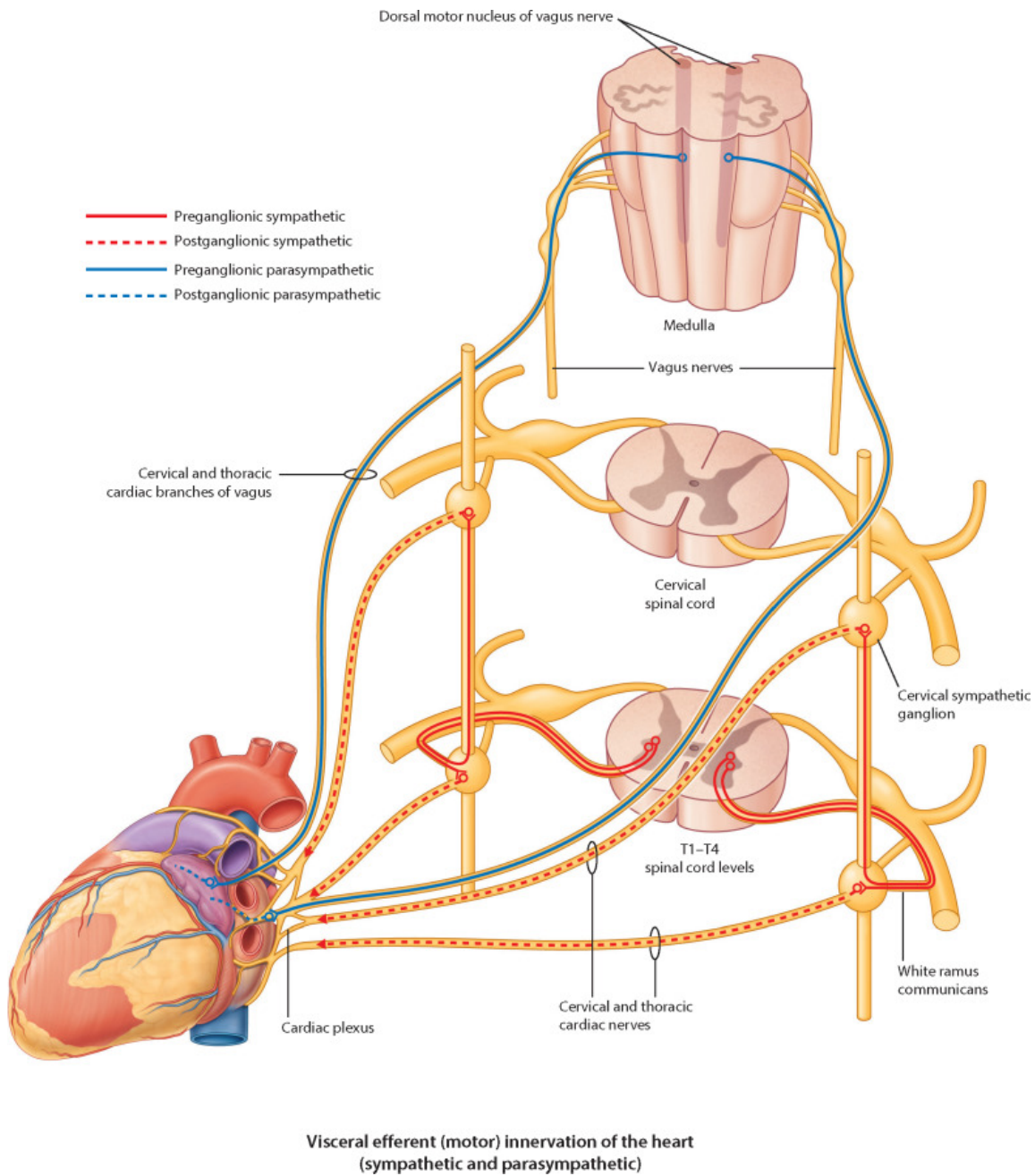
Transverse section through thorax
(approximately T7)

Dermatomes and cutaneous nerves

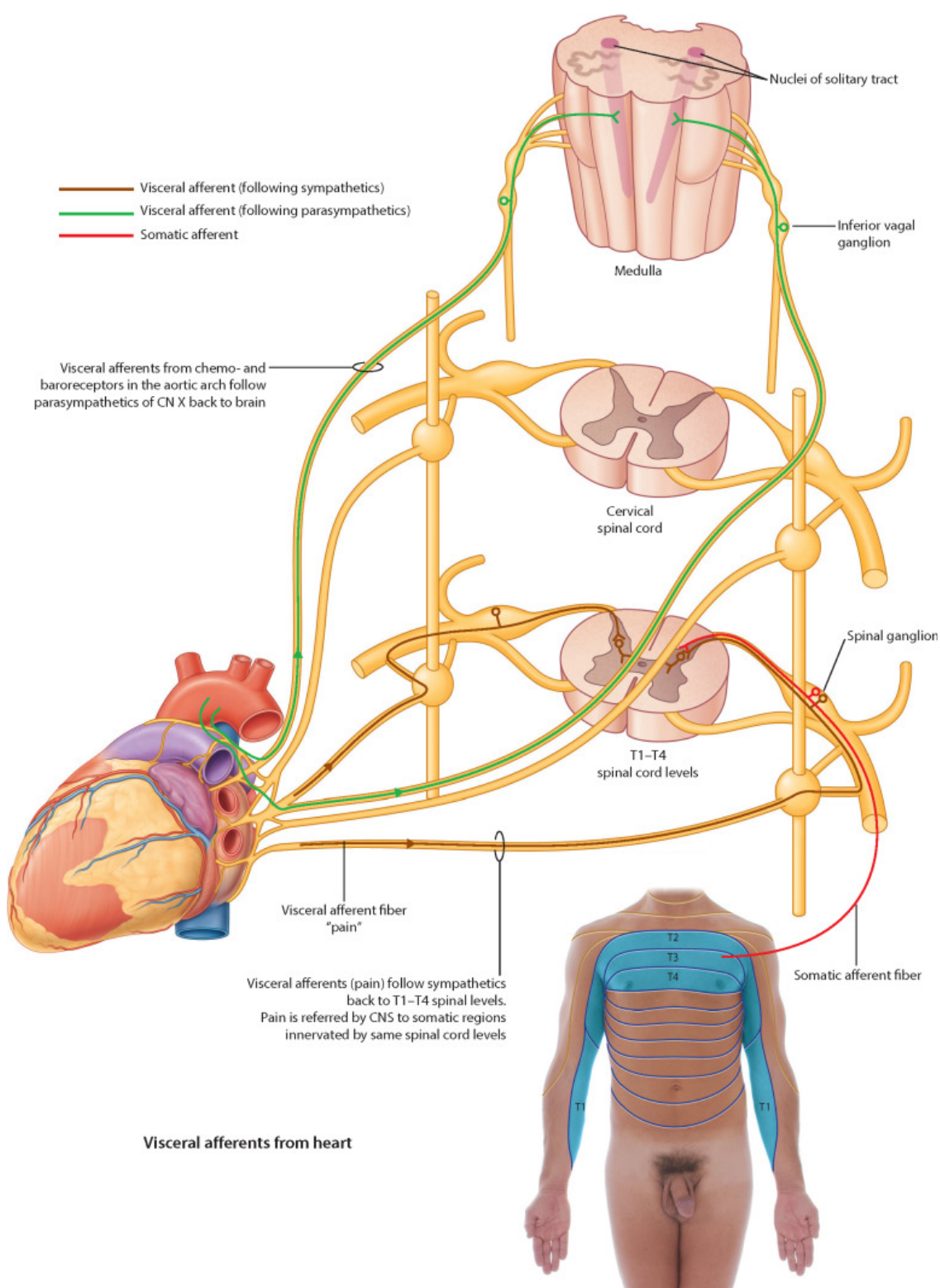


Dermatomes and cutaneous nerves of the thoracic region

Visceral efferent (motor) innervation of the heart



Visceral afferents



Tables

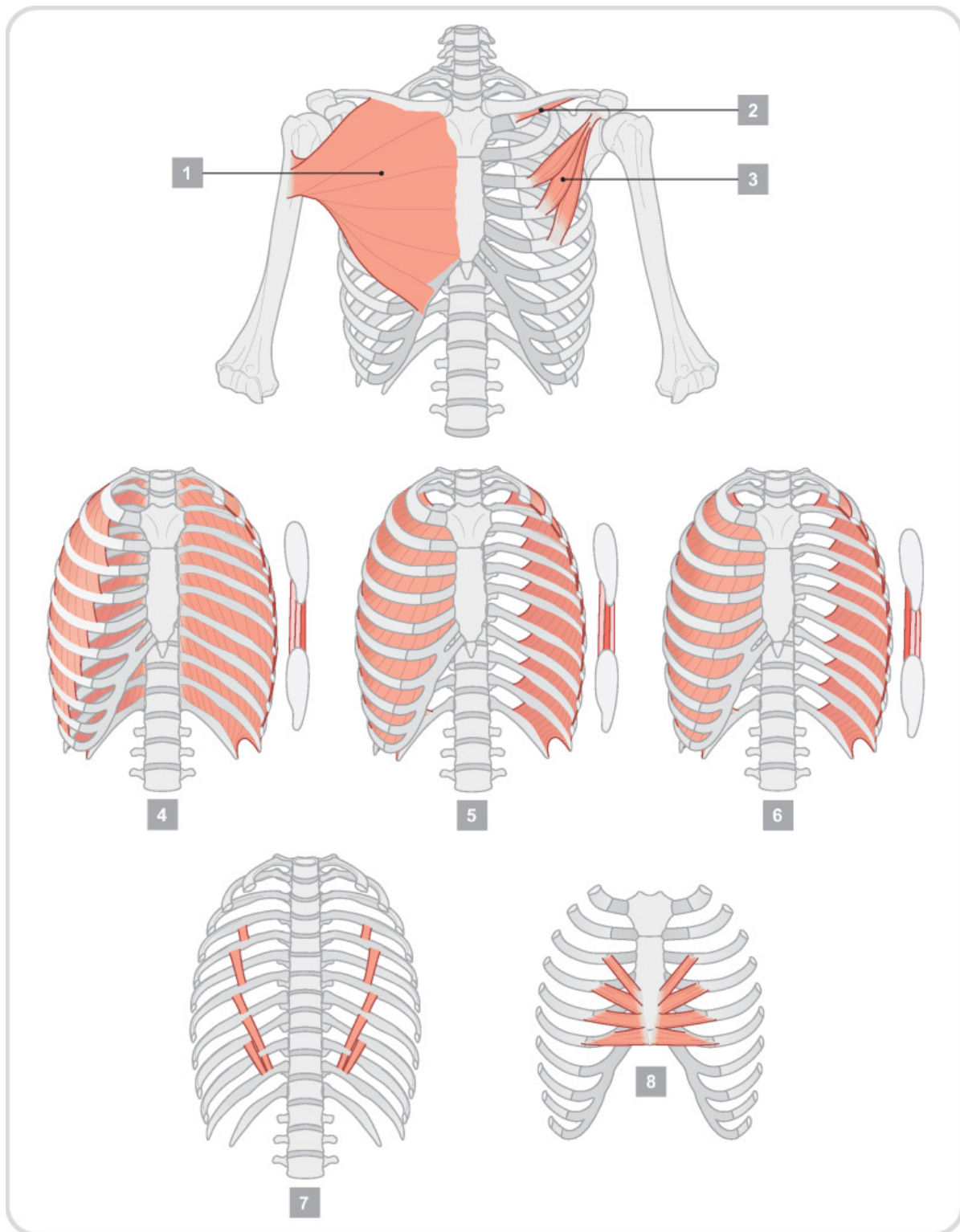
Muscles of the pectoral region

Muscle	Origin	Insertion	Innervation	Function
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Muscle		Origin	Insertion	Innervation	Function
Pectoralis major	1	Medial half of clavicle and anterior surface of sternum, first seven costal cartilages, aponeurosis of external oblique	Lateral lip of intertubercular sulcus of humerus	Medial and lateral pectoral nerves	Adduction, medial rotation, and flexion of the humerus at the shoulder joint
Subclavius	2	Rib I at junction between rib and costal cartilage	Groove on inferior surface of middle third of clavicle	Nerve to subclavius	Pulls clavicle medially to stabilize sternoclavicular joint; depresses tip of shoulder
Pectoralis minor	3	Anterior surfaces of the third, fourth and fifth ribs, and deep fascia overlying the related intercostal spaces	Coracoid process of scapula	Medial pectoral nerves	Depresses tip of shoulder; protracts scapula

Muscles of the thoracic wall

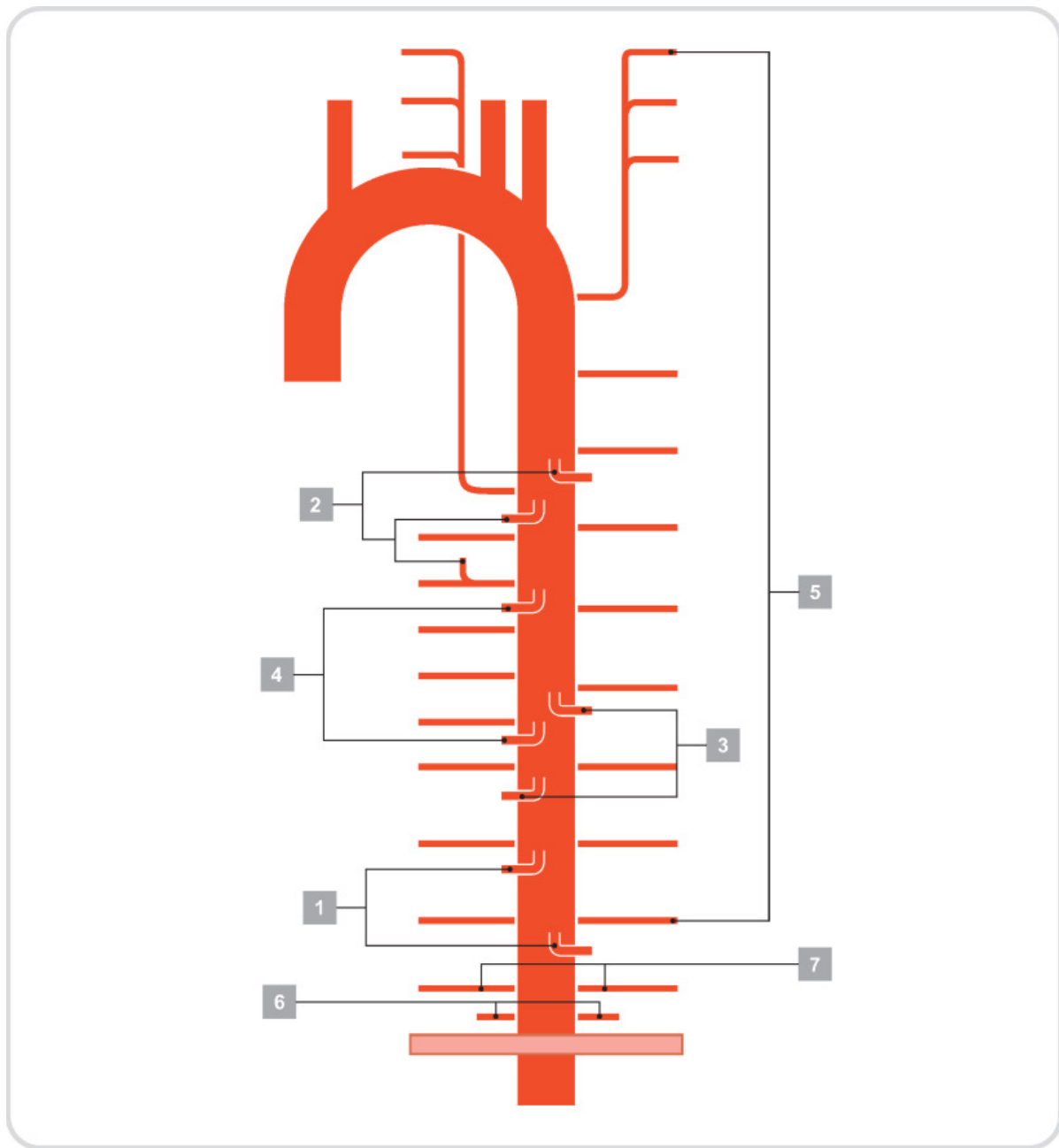
External intercostal	4	Inferior margin of rib above	Superior margin of rib below	Intercostal nerves; T1–T11	Most active during inspiration; supports intercostal space; moves ribs superiorly
Internal intercostal	5	Lateral edge of costal groove of rib above	Superior margin of rib below deep to the attachment of the related external intercostal	Intercostal nerves; T1–T11	Most active during expiration; supports intercostal space; moves ribs inferiorly
Innermost intercostal	6	Medial edge of costal groove of rib above	Internal aspect of superior margin of rib below	Intercostal nerves; T1–T11	Acts with internal intercostal muscles
Subcostales	7	Internal surface (near angle) of lower ribs	Internal surface of second or third rib below	Related intercostal nerves	May depress ribs
Transversus thoracis	8	Inferior margins and internal surfaces of costal cartilages of second to sixth ribs	Inferior aspect of deep surface of body of sternum, xiphoid process and costal cartilages ribs IV–VII	Related intercostal nerves	Depresses costal cartilages



Branches of the thoracic aorta

Branches	Origin and course
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Branches		Origin and course
Pericardial branches	1	A few small vessels to the posterior surface of the pericardial sac
Bronchial branches	2	Vary in number, size, and origin—usually, two left bronchial arteries from the thoracic aorta and one right bronchial artery from the third posterior intercostal artery or the superior left bronchial artery
Esophageal branches	3	Four or five vessels from the anterior aspect of the thoracic aorta, which form a continuous anastomotic chain—anastomotic connections include esophageal branches of the inferior thyroid artery superiorly, and esophageal branches of the left inferior phrenic and the left gastric arteries inferiorly
Mediastinal branches	4	Several small branches supplying lymph nodes, vessels, nerves, and areolar tissue in the posterior mediastinum
Posterior intercostal arteries	5	Usually nine pairs of vessels branching from the posterior surface of the thoracic aorta—usually supply lower nine intercostal spaces (first two spaces are supplied by the supreme intercostal artery—a branch of the costocervical trunk)
Superior phrenic arteries	6	Small vessels from the lower part of the thoracic aorta supplying the posterior part of the superior surface of the diaphragm—they anastomose with the musculophrenic and pericardiophrenic arteries
Subcostal artery	7	The lowest pair of branches from the thoracic aorta located inferior to rib XII



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